

THE NEW! **Amateur 73[®] Radio Today**

MAY 2000
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CANADA \$4.95

INSIDE

**Foxy
ELTs**

**Build
Two
Rcvrs**

Reviews:

- Kenwood
TM-D700A
- Oak Hills
OHR 500
- LDG DWM-4
- EMTECH NW-40

On the Cover:
See page 33

PLUS

**QRP — Having a Ball with a
Hundred-Buck Station**

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THE NEW!

73 Amateur Radio Today

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QRX . . .

Restructuring Summary

For those of you who never got it, or got it and still don't get it, here is a good review of the basics of the FCC's recent Report and Order restructuring the ARS.

The bottom line was that starting on April 15, 2000, there would be the license classes — Technician, General, and Amateur Extra — and a single Morse code requirement — 5 wpm.

"We believe that an individual's ability to demonstrate increased Morse code proficiency is not

necessarily indicative of that individual's ability to contribute to the advancement of the radio art," the FCC said.

Besides drastically streamlining the Amateur Radio licensing process, the FCC said its actions would "eliminate unnecessary requirements that may discourage or limit individuals from becoming trained operators, technicians, and electronic experts."

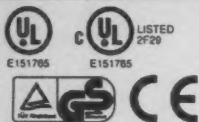
Although no new Novice and Advanced licenses will be issued after the effective date of the Report and Order, the FCC does not plan to automatically

Continued on page 6

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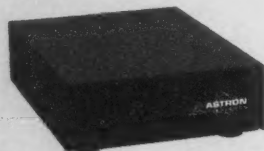
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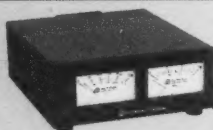
MODEL SS-10TK



MODEL SS-12IF



MODEL SS-18



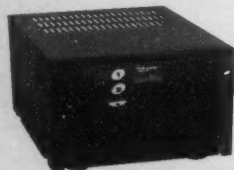
MODEL SS-25M



MODEL SRM-30



MODEL SRM-30M-2



MODEL SS-12SM/GTX



MODEL SS-10EFJ-98

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- OVER TEMPERATURE SHUTDOWN

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1 1/2 x 6 x 9	3.2
SS-12	10	12	1 1/2 x 6 x 9	3.4
SS-18	15	18	1 1/2 x 6 x 9	3.6
SS-25	20	25	2 1/2 x 7 x 9 1/2	4.2
SS-30	25	30	3 1/4 x 7 x 9 1/2	5.0

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2 1/2 x 7 x 9 1/2	4.2
SS-30M*	25	30	3 1/4 x 7 x 9 1/2	5.0

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/2	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30M	25	30	3 1/2 x 19 x 9 1/2	7.0

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30-2	25	30	3 1/2 x 19 x 9 1/2	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/2	11.0

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

RAMSEY

Doppler Direction Finder

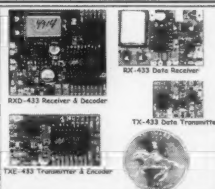
Track down jammers and hidden transmitters with ease! This is the famous WA2EBY DF'er featured in April 99 QST. Shows direct bearing to transmitter on compass style LED display, easy to hook up to any FM receiver. The transmitter - the object of your DF'ing - need not be FM, it can be AM, FM or CW. Easily connects to receiver's speaker jack and antenna, unit runs on 12 VDC. We even include 4 handy home-brew "mag mount" antennas and cable for quick set up and operation! Whips can be cut and optimized for any frequency from 130-1000 MHz. Track down that jammer, win that fox hunt, zero in on that downed Cessna - this is an easy to build, reliable kit that compares most favorably to commercial units costing upwards of \$1000.00! This is a neat kit!!

DDF-1, Doppler Direction Finder Kit \$149.95

Wireless RF Data Link Modules

RF link boards are perfect for any wireless control application; alarms, data transmission, electronic monitoring...you name it. Very stable SAW resonator transmitter, crystal controlled receiver - no frequency drift! Range up to 600 feet, license free 433 MHz band. Encoder/decoder units have 12 bit Holtek HT-12 series chips allowing multiple units all individually addressable, see web site for full details. Super small size - that's a quarter in the picture! Run on 3-12 VDC. Fully wired and tested, ready to go and easy to use!

RX-433 Data Receiver.....\$16.95 TX-433 Data Transmitter.....\$14.95
RXD-433 Receiver/Decoder.....\$21.95 TXE-433 Transmitter/Encoder.....\$19.95



World's Smallest TV Transmitters



We call them the 'Cubes'.... Perfect video transmission from a transmitter you can hide under a quarter and only as thick as a stack of four pennies - that's a nickel in the picture! Transmits color & B&W with fantastic quality - almost like a direct wired connection to any TV tuned to cable channel 59. Crystal controlled for no frequency drift with performance that equals models that cost hundreds more! Basic 20 mW model transmits up to 300' while the high power 100 mW unit goes up to 1 1/4 mile. Their very light weight and size make them ideal for balloon and rocket launches, R/C models, robots - you name it! Units run on 9 volts and hook-up to most any CCD camera or standard video source. In fact, all of our cameras have been tested to mate perfectly with our Cubes and work great. Fully assembled - just hook-up power and you're on the air! One customer even put one on his dog!

C-2000, Basic Video Transmitter.....\$89.95

C-2001, High Power Video Transmitter.....\$179.95

CCD Video Cameras

Top quality Japanese Class 'A' CCD array, over 440 line resolution, not the off-spec arrays that are found on many other cameras. Don't be fooled by the cheap CMOS single chip cameras which have 1/2 the resolution, 1/4 the light sensitivity and draw over twice the current! The black & white models are also super IR (Infra-Red) sensitive. Add our invisible to the eye, IR-1 illuminator kit to see in the dark! Color camera has Auto gain, white balance, Back Light Compensation and DSP! Available with Wide-angle (60°) or super slim Pin-hole style lens. Run on 9 VDC, standard 1 volt p-p video. Use our transmitters for wireless transmission to TV set, or add our IB-1 Interface board kit for super easy direct wire hook-up to any Video monitor, VCR or TV with A/V input. Fully assembled, with pre-wired connector.

CCDWA-2, B&W CCD Camera, wide-angle lens \$69.95
CCDPH-2, B&W CCD Camera, slim fit pin-hole lens \$69.95
CCDCC-1, Color CCD Camera, wide-angle lens \$129.95
IR-1, IR Illuminator Kit for B&W cameras \$24.95
IB-1, Interface Board Kit \$14.95

AM Radio Transmitter

Operates in standard AM broadcast band. Pro version, AM-25, is synthesized for stable, no-drift frequency and is settable for high power output where regulations allow, typical range of 1-2 miles. Entry-level AM-1 is tunable, runs FCC maximum 100 mW, range 1/4 mile. Both accept line-level inputs from tape decks, CD players or mike mixers, run on 12 volts DC. Pro AM-25 includes AC power adapter, matching case and bottom loaded wire antenna. Entry-level AM-1 has an available matching case and knob set that dresses up the unit. Great sound, easy to build - you can be on the air in an evening!

AM-25, Professional AM Transmitter Kit \$129.95

AM-1, Entry level AM Radio Transmitter Kit \$29.95

CAM, Matching Case Set for AM-1 \$14.95

Mini Radio Receivers



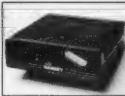
Imagine the fun of tuning into aircraft a hundred miles away, the local police/fire department, ham operators, or how about Radio Moscow or the BBC in London? Now imagine doing this on a little radio you built yourself - in just an evening! These popular little receivers are the nuts for catching all the action on the local ham, aircraft, standard FM broadcast radio, shortwave or WWV National Time Standard radio bands. Pick the receiver of your choice, each easy to build, sensitive receiver has plenty of crystal clear audio to drive any speaker or earphone. Easy one evening assembly, run on 9 volt battery, all have squelch except for shortwave and FM broadcast receiver which has subcarrier output for hook-up to our SCA adapter. The SCA-1 will tune in commercial-free music and other 'hidden' special services when connected to FM receiver. Add our snazzy matching case and knob set for that smart finished look!

AR-1, Airband 108-136 MHz Kit \$29.95
HFRC-1, WWV 10 MHz (crystal controlled) Kit \$34.95
FR-1, FM Broadcast Band 88-108 MHz Kit \$24.95
SR-1, Shortwave 4-11 MHz Band Kit \$29.95
SCA-1 SCA Subcarrier Adapter kit for FM radio \$27.95
FR-6, 6 Meter FM Ham Band Kit \$34.95
FR-10, 10 Meter FM Ham Band Kit \$34.95
FR-146, 2 Meter FM Ham Band Kit \$34.95
FR-220, 220 MHz FM Ham Band Kit \$34.95
Matching Case Set (specify for which kit) \$14.95

PIC-Pro Pic Chip Programmer

Easy to use programmer for the PIC16C84, 16F84, 16F83 microcontrollers by Microchip. All software - editor, assembler, run and program - as well as free updates available on Ramsey download site! This is the popular unit designed by Michael Covington and featured in Electronics Now, September 1998. Connects to your parallel port and includes the great looking matching case, knob set and AC power supply. Start programming those really neat microcontrollers now...order your PICPRO today!

PIC-1, PICPRO PIC Chip Programmer Kit \$59.95



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A super price on a full featured RF signal generator! Covers 100 KHz to 999.9999 MHz in 10 Hz steps. Tons of features; calibrated AM and FM modulation, 90 front panel memories, built-in RS-232 interface, +10 to -130 dBm output and more!

Fast and easy to use, its big bright vacuum fluorescent display can be read from anywhere on the bench and the handy 'smart-knob' has great analog feel and is intelligently enabled when entering or changing parameters in any field - a real time saver! All functions can be continuously varied without the need for a shift or second function key. In short, this is the generator you'll want on your bench, you won't find a harder working RF signal generator - and you'll save almost \$3,000 over competitive units!

RSG-1000B RF Signal Generator \$1995.00

Super Pro FM Stereo Transmitter



Professional synthesized FM Stereo station in easy to use, handsome cabinet. Most radio stations require a whole equipment rack to hold all the features we've packed into the FM-100. Set freq with Up/Down buttons, big LED display. Input low pass filter gives great sound (no more squeals or swishing from cheap CD inputs!) Limiters for max 'punch' in audio - without over mod, LED meters to easily set audio levels, built-in mixer with mike, line level inputs. Churches, drive-ins, schools, colleges find the FM-100 the answer to their transmitting needs, you will too. Great features, great price! Kit includes cabinet, whip antenna, 120 VAC supply. We also offer a high power export version of the FM-100 fully assembled with one watt of RF power, for miles of program coverage. The export version can only be shipped if accompanied by a signed statement that the unit will be exported.

FM-100, Pro FM Stereo Transmitter Kit \$249.95

FM-100WT, Fully Wired High Power FM-100 \$399.95

FM Stereo Radio Transmitters



No drift, microprocessor synthesized! Great audio quality, connect to CD player, tape deck or mike mixer and you're on the air. Strappable for high or low power! Runs on 12 VDC or 120 VAC. Kit includes snazzy case, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized Stereo Transmitter Kit \$129.95

Lower cost alternative to our high performance transmitters. Great value, easily tunable, fun to build. Manual goes into great detail about antennas, range and FCC rules. Handy for sending music thru house and yard, ideal for school projects too - you'll be amazed at the exceptional audio quality! Runs on 9V battery or 5 to 15 VDC. Add matching case and whip antenna set for nice 'pro' look.

FM-10A, Tunable FM Stereo Transmitter Kit \$34.95

CFM, Matching Case and Antenna Set \$14.95

FMAC, 12 Volt DC Wall Plug Adapter \$9.95

RF Power Booster



Add muscle to your signal, boost power up to 1 watt over a freq range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM transmitters, providing radio service through an entire town. Runs on 12 VDC. For a neat finished look, add the nice matching case set. Outdoor unit attaches right at the antenna for best signal - receiving or transmitting, weatherproof, too!

LPA-1, Power Booster Amplifier Kit \$39.95

CLPA, Matching Case Set for LPA-1 Kit \$14.95

LPA-1WT, Fully Wired LPA-1 with Case \$99.95

FMBA-1, Outdoor Mast Mount Version of LPA-1 \$59.95

FM Station Antennas

For maximum performance, a good antenna is needed. Choose our very popular dipole kit or the Comet, a factory made 5/8 wave coilinear model with 3.4 dB gain. Both work great with any FM receiver or transmitter.

TM-100, FM Antenna Kit \$39.95

FMA-200, Vertical Antenna \$114.95



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NEVER SAY DIE

Wayne Green W2NSD/1

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5/5 Oh, Oh!

With May 5, 2000, looming, I got out my copy of Richard Noone's *5/5/2000 Ice the Ultimate Disaster* book. Well, it won't be long before 5/5, like Y2K, is history. Will the every six thousand year alignment of the planets, plus the buildup of ice, off center, at the poles, trigger a pole shift? Could Nos-tradamus, in his prediction of a coming pole shift, which he said would wipe out 97% of mankind, be off by a few years? Will Chet Snow's *Mass Dreams of the Future*, which also predicts a mass extinction at around this time, be wrong, too? Then there's René's *Last Skeptic of Science*, which makes a really good case for past pole shifts having caused mass extinctions.

Chet Snow's book was the result of projecting hundreds of people under hypnosis into their next lives. He found that 98% were unable to reincarnate in the 21st century, due to an acute shortage of babies. By the 22nd century it was down to 90% unable to reincarnate. He traced this back to some sort of catastrophe in the very early 21st century. Like around now.

Okay, okay, so maybe Nos-tradamus has just made a long streak of incredibly lucky guesses in the past. And though J.B. Rhine's work 50 years ago, plus that more recently at the Princeton PEAR Labs, has scientifically proven the reality of pre-cognition, with Dean Radin's *The Conscious Universe* leaving even the most dedicated skeptics no place to hide from the results of hundreds of scientific research projects, outfits such as SCICOP have their blinders strapped on so tightly that no amount of scientific proof is visible.

So, I'll be seeing you in June, right? Either here in my editorial, or in a truly massive crowd at the Pearly Gates. Whistle your call, if you're a ham, so I can find you.

ARRL's New President

I see where the ARRL directors have elected a new president. Yes, that got me to thinking. In my memory, I can't think of a single ARRL president that's made even the slightest mark on the hobby. It's a position of enormous perceived prestige and virtually zero importance. The reality that I see is that the ARRL presidency is a show position, with no more power over the League than the directors, and that, in my experience, has also approached zero. It's all a necessary façade to bolster the pretense that the League is somehow connected to the members.

The League is actually run by a small group at HQ, and all the rest seems to be just window dressing. Who you elect as directors is irrelevant, and who they elect as president seems ditto.

No, I see the League as not even remotely democratic. It's a commercial publishing house posing as a membership organization in order to get preferential tax and postal advantages.

I remember the most prestigious president they ever had, Herbert Hoover Jr., the son of the president who got the blame for the depression that Congress, bowing to pressure from the banks, caused — mainly with the Hoot-Smalley tariff act. Wall Street collapsed like the house of cards it was and it took WWII to get us out of the mess.

I talked with Hoover W6ZH a few times and found him a nice guy, but not top-heavy with brain power. By a strange coincidence, Hoover resigned as president of the League just three days after I visited his good friend Barry Goldwater K7UGA, and explained in detail the many ways the League General Manager had been taking advantage of Hoover's naivety, getting him to do the League's dirty work — such as visiting the president of Venezuela to get the ham radio exhibit out of the Venezuelan

exhibit at the New York World's Fair.

The ham manufacturers, in frustration over the League's ham station in the Coca Cola exhibit, which they felt had been sold out to Hallicrafters, had made a deal with Venezuela to feature a large operating ham radio station as the centerpiece of their exhibit. It was beautiful and showed off the equipment of all of the ham manufacturers (except Hallicrafters, naturally).

The original deal between the League and Coca Cola, according to Bill Leonard W2SKE, who set the deal up in the first place and was a very good friend of mine (we flew around the world together, visiting 26 countries and operating on 20m from the plane as we flew), was for the ham station to take up most of the ground floor of the exhibit building. When Bill learned that the League General Manager had made an under-the-table \$25,000 deal with Hallicrafters to use only their equipment, he told me he then informed his contact at Coca Cola. The company quickly canceled their plans for the big exhibit and gave the league a small room on the second floor, next to the toilets, for their exhibit. Few fairgoers ever saw ARRL's ham exhibit.

Meanwhile, Hammarlund spearheaded a ham industry cooperative effort to get a better show-place for the hobby. They got Venezuela to go for it. The resulting exhibit was one ham could be proud of and was visited by millions of fairgoers.

ARRL HQ was furious, so they got Hoover to try to get the president of Venezuela to stop the competing ham station.

Well, that was just one of many times ARRL used Hoover's name, as I explained to Barry.

Oops, I sure got off on a tangent. Fortunately, that hardly ever happens.

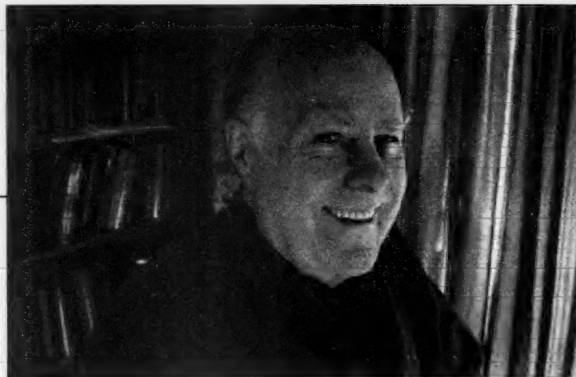
Now, is the above "trashing the League"? Or is it just expressing my opinion, based on the facts as I understand them — as a 60-year loyal member? Yes, I'm critical of some of the things HQ does, but I'm far more critical of the things they don't do, but should.

The League does a nice job of publishing. Oh, I'd run *QST* differently, if I was the publisher, but they put out some excellent books. And where would we be without their Q&A manuals to make getting a ham ticket just a matter of memorizing a few A's? That's all I had to do. Later the Navy did a wonderful job of teaching me electronic theory.

I'd like to see the ARRL directors communicating from the members to HQ rather than the other way around. The operation of the League has always been much more like the Kremlin than Congress. I'd like to see a League president who had the power to hire and fire the HQ staff, and who would be paid something more than an expense account. We (speaking as a member) need a president who can get on AM radio and TV and help promote the hobby. We need one who can visit the heads of foreign countries and help amateur radio to grow in those countries, as I did when I visited King Hussein. This kind of activity could help us a lot when amateur radio matters are up for votes at future International Telecommunications Union conferences, where we need as many countries supporting us as we can get.

I'll tell you what. Find the oldest ARRL member you can and ask him to cite one single thing any ARRL president has ever done of any significance for the hobby. Please advise.

Continued on page 34



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continued from page 1

upgrade any existing license privileges. The ARRL had proposed a one-time, across-the-board upgrading of current Novice and Tech Plus licensees to General class, but the FCC declined to adopt the idea. This means that current licensees will retain their current operating privileges, including access to various modes and subbands, and will be able to renew their licenses indefinitely.

Starting April 15, 2000, individuals who qualified for the Technician class license prior to March 21, 1987, would be able to upgrade to General class by providing documentary proof to a Volunteer Examiner Coordinator, paying an application fee, and completing FCC Form 605.

The FCC's decision not to automatically upgrade Novice and Tech Plus licensees means the current Novice/Tech Plus HF subbands will remain and not be "refarmed" to higher class licensees as the ARRL had proposed. The FCC said it did not reformat these subbands because there was "no consensus" within the amateur community as to what to do with them.

The FCC decided to lump Technician and Tech Plus licensees into a single licensee database, all designated as "Technician" licensees. Those who can document having passed the 5 wpm Morse code examination will continue to have the current Tech Plus HF privileges. The FCC said it may request documentation from a licensee or VEC to verify whether a licensee has passed a telegraphy examination.

The FCC action also authorizes Advanced Class hams to prepare and administer General class examinations, and eliminates Radio Amateur Civil Emergency Service (RACES) station licenses. RACES will remain, however.

Under the new licensing scheme, there will be four examination elements. Element 1 will be the 5 wpm Morse code exam. Element 2 will be a 35-question Technician exam; Element 3 will be a 35-question General exam; and Element 4 will be a 50-question Amateur Extra exam. The FCC has left it in the hands of the National Conference of VECs Question Pool Committee to determine the specific mix and makeup of written examination questions.

Elimination of the 13 and 20 wpm Morse requirements means an end to physician certification waivers for applicants claiming an inability to pass the Morse code examination due to physical handicap.

The FCC disagreed with the League's suggestion that it undertake a restructuring of operating privileges along with licensing restructuring. The Commission said it wanted to give the amateur community a chance to "reach a consensus" regarding new technologies before it tried to restructure amateur operating privileges and frequencies.

A copy of the entire Report and Order (FCC 99-412) is available at [www.arl.org/announce/regulatory/wt98-143ro.pdf] or [www.fcc.gov/

Daily_Releases/Daily_Business/1999/db991230/fcc99412.txt].

Thanks to the January 2000 issue of WIRELOOSE, monthly newsletter of Woodbridge (VA) Wireless Inc.

St. Louis = Heils

Julie Heil is a local morning anchor for "Good Morning America" on Channel 30. Just a few remote control buttons away, her father, Bob "High Tech" Heil, is the guy with all the high-tech and electronics answers on Channel 5's morning show.

"We're never on opposite each other," Julie said. "I usually miss him because he's on the early block. I'm usually in the shower or hitting the snooze button."

Bob hits the Channel 5 airwaves during the week in the 5 to 7 a.m. slot, and Julie is on between 7 and 9 a.m. Monday through Friday during "Good Morning America."

It's a miracle that both she and her father are on the early shows, because neither of them is a morning person, Julie said. "I think it's genetic."

Bob said he always watches Julie. If he can't, he tapes the show and watches it later. Then the entire family can watch Julie and critique her hair, makeup, and script.

"They are tougher on me than the news director," Julie said with a laugh. "He thinks he's hard on me? He should come listen to my family."

"Well, I usually tell her her hair didn't look so good or something. Or her shirt looked nice," Bob said. "I critique the good and the bad."

"What are parents for? They are very honest about it," Julie said.

Julie, 31, of Fairview Heights, has been a morning news anchor for KDNL, Channel 30, since January.

Bob, 58, of Belleville, has been the high-tech guy at Channel 5 for about a month. He also owns Heil Sound Ltd. in Fairview Heights.

"For some reason, the guys at Channel 5 won't let me wear my button," Bob said chuckling. "The button says, 'Watch my daughter Julie, next on Channel 30.'"

Julie said she decided to pursue a broadcasting career because she grew up listening to her dad on KMOX radio and meeting people in the entertainment business.

"Being around my dad and his lifestyle, I was always in front of people. I was in theater and musicals in high school," Julie said. "I think I'm the shyest person in the world, but I've learned to overcome it."

When Julie decided she wanted to pursue a career in television broadcasting, she knew exactly what position she wanted.

"When she was in high school, I asked her what she wanted to do," Bob said. "She said she wanted to be a news anchor for Channel 5."

Using connections he made through his ham radio hobby, Bob knew someone who knew someone who was able to arrange for Julie to

be on the set of "The Today Show" in New York to watch Jane Pauley in action.

"When you are 18 years old and standing on the set of 'The Today Show' and you just started broadcasting school, that's just a great incentive," Julie said. "Jane is one of the biggest people in broadcasting whom I admire."

Before landing the news anchor position at Channel 30, Julie worked the "vampire shift" at Channel 5. "I met a lot of wonderful people at Channel 5 who are still friends," Julie said.

"And people are always coming up to me and asking me about her," Bob added.

Although Bob enjoys his spot on Channel 5, he said he misses radio.

"I had an hour on KMOX. I get three minutes on Channel 5. What can I do in three minutes?" he asked. "I miss taking calls from people, too. I like talking to people. But, I can show things on TV that I couldn't on the radio."

Before moving to Channel 30, Julie was at an ABC affiliate station, WAND, in Decatur. She wanted to come back to the St. Louis market and to her family. Through an agent, Julie learned that Channel 30 had an opening. The agent also knew that Bob knew the news director and recommended she ask her dad to get in touch with the news director.

"He knew the news director from when he was at KMOX," Julie said. "He called down there and touched base with him."

Dad opened the door, and then it was up to Julie to prove herself.

Julie said she loves her job and enjoys going to work — even if she does have to get up with the chickens.

"For me to get up that early in the morning when I'm not a morning person tells me I'm in the right job with the right people," she says.

Reprinted with permission from and thanks to Jennifer A. Bowen, Editor, Lifestyle section, Belleville (IL) News-Democrat.

Johnson Space Center Amateur Radio Club Offers "Remote Membership"

The Johnson Space Center Amateur Radio Club, in the NASA complex in Houston TX, is offering "remote membership" to anyone wishing to join. The JSARC is the club which, among lots of activities, teaches astronauts to be ham radio operators. The club's callsign is W5RRR. Membership is \$15 per year, and patches are available as well.

For more information, please contact club secretary Larry Dietrich, at (281) 483-9198, or E-mail him at [ldietric@ems.jsc.nasa.gov].

Thanks to Kent Castle, NASA/Houston, and the January 2000 Badger State Smoke Signals. 73

MFJ Switching Power Supplies

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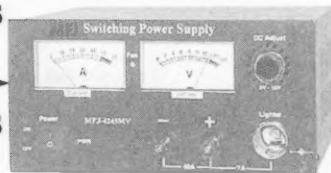
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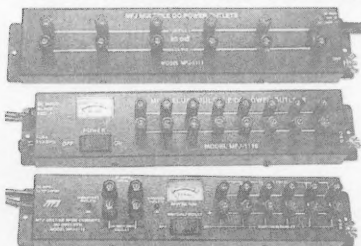
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From the Ham Shack

Dan Calzaretta NX9C. I have finished reading the FCC info on restructuring (40 pages of report and 30 supplemental pages). This is what I think: Overall, I think it is a great idea. I am also glad about the code — and I do 90% of my operating on CW! I really agree with the statement by the FCC: CW proficiency does not mean good operating skills.

I just don't buy the argument that I see on some of the ham radio newsgroups that the bands are going to be flooded by Cbers. First, I hear some awful stuff on 80 and 20 meters NOW, and these people had to pass AT LEAST a 13 wpm code test.

I think the real key is better enforcement by the FCC (which seems to be happening) and better "self-policing" by the ham community.

It also means that every single amateur radio operator has a responsibility. We must show off our hobby and help those interested in becoming hams to understand what ham radio is about. I teach at a small private school and have a ham radio class and club station (N7XP — the Pacific Crest Community School Amateur Radio Club in Portland, Oregon). Kids still get excited about ham radio, despite what we hear about video games and the Internet.

What REALLY disturbs me is all of the "us" versus "them" that I see on the newsgroups. Real hams and not real hams. Ugghhhh. We are all hams. This is a hobby. It is supposed to be fun. And let's face it, if we don't get new people in we ALL will lose our frequencies due to lack of activity.

As to the code, this is where the most violent confrontations are happening in the newsgroups. (And by the way, talk about poor "operating" skills. Hopefully, most of the hams who are posting to the newsgroups spend more time on the Internet than on the radio. They must be terrible operators based on their foul language and lack of intelligent discourse on the Web!) Again, I LOVE CW. But I think that CW testing is no more or less valuable than testing someone's ability to set up and send various data modes, or the ability to construct a basic circuit, etc., etc. I see it not as a way to determine how dedicated someone is to ham radio as much as a "that's how I did it and everyone else should, too" response by some hams. I do think, though, that the CW portions of the bands should be protected

for that exclusive use (along with data modes where appropriate).

The thing that is really regrettable about all of this is the hatred hams are feeling toward each other now. Who cares what class of license people are. Let's all have fun. I venture into the Novice CW portion of the bands and the Novice/Tech Plus portions of 10 meters whenever I can. Let's welcome people and embrace what they have to offer to the hobby and stop complaining about what class license they are and whether they took a 5 wpm test or 20 wpm test or no code test whatsoever.

I guess it is up to all of us as hams to do the following: (1) Help people get into the hobby. (2) Once they are in, treat them all equally regardless of license class. (3) Be good operators, so people learn by example how it should be done. (4) Stop fighting with each other, so we don't lose our frequencies. (5) Continue to push the FCC for better enforcement of the rules.

Well, I know that is a bit long-winded, but you are always asking for people to write! Keep up the good work.

H.B. (Cork) Corcoran W5BYG. Hi, Wayne: I've been a fan of yours since I first started reading *CQ*, and I was a very early subscriber to 73. There are only two magazines where the first thing I read is the editorial. One was *Astounding*, now *Analog Science Fiction*, while John Campbell was editor, and the other is 73. Now to the reasons for this note. One of the subjects that was mentioned had to do with learning the code. Wayne, I haven't read your book on the subject so some of this may be redundant. I learned the code the wrong way, as most of us did, by memorizing the dits and dahs of each letter at a slow speed and then slogging my way upward toward 13 wpm, hitting the proverbial wall at about 9 or 10 wpm, which seemed to take forever before breaking through. Then my mind finally switched the way it was decoding the letters from the sound pieces of the letter to the sound of the whole letter. When this happened, my speed shot up to about 15 wpm in a matter of only a few days. I suspect this is what you advocate in your book, and that is learning the sound of the whole letter at about 15 wpm from the very beginning. Now comes the reason for all this preliminary discussion. A group of us that were

members of the McDonnell Douglas Amateur Radio Club at our astronautics facility in Huntington Beach CA (where the Saturn S-IV was designed and built) started practicing our code each day in one of the conference rooms during lunch. This was several years ago, and we were using a reel-to-reel tape recorder with the 3-3/4, 7-1/2, and 15 ips selector switch. We were working on 15 wpm. One day when the code started, it was coming at us at 30 instead of 15 wpm because someone else had used the recorder and had changed the playback speed. Before the person running the tapes could get back over to the recorder, several of us had said, "just leave it there for five minutes," which he did. Admittedly, I was only able to copy a few letters during the time at that speed, but when we slowed the tape down to normal, it seemed so slow that we had all day between letters. We started doing this double-speed session for the first five minutes every day, and the rate that our copy speed started to progress was incredible. It seemed like it was no time at all before I was copying at 24 wpm. At this speed, another surprising thing happened. I started recognizing the sound of whole words and began to finally understand how old-timers could head copy code at what to me was incredible speeds of 40 or 50 wpm and above. They weren't listening to the letters, they were listening to the words, and it was just like someone talking to them. One of the things that really helped improve my accuracy and reduce errors was to force myself to copy behind by at least one letter. This allowed the brain to make corrections and eliminate anticipation of the next letter as a word developed before writing the wrong letter on the paper. The further behind you can copy, the fewer mistakes you make.

Good advice! And yes, the secret of my Blitz Code Course is in starting 'em out learning the sound of the letters, not the dots and dashes. And then graduating to words. Tens of thousands have aced the code test after a weekend of practice this way. But that'll soon be irrelevant, with my one-hour 5 wpm super-blitz method being all that's needed. — Wayne.

73

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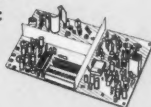
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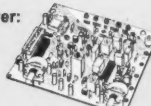
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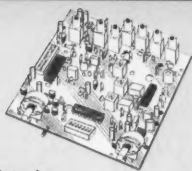


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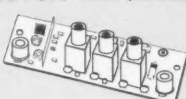
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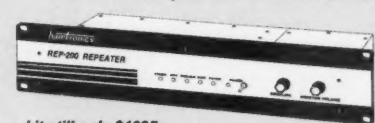
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When Less Is More

Check out the excitement of QRP.

About twenty years ago, when I first became interested in amateur radio, I was Elmered by some old-timers who delighted in telling me stories of what the hobby was like "back in the old days." Not only did they have to walk ten miles to school every day carrying their little brother and sister on their back, they had to pass a "real" examination, draw the schematic for a triple-conversion radio from memory, design a linear amplifier based on beer bottles, and send the entire text of the US Declaration of Independence at 30 wpm with no mistakes. They had to cut the firewood to make the fire to make the steam to generate the electricity to run their radios, which of course they had made themselves from a handful of paper clips, rocks, and spit. Twenty years farther down the coax, I'm the old-timer, entertaining the current crop of newbies with tales from the Golden Age of Ham Radio. I'm sure they think my stories are just as far-fetched, but I have a big advantage because I can literally recreate that world for them, through the wonders of modern QRP.

By definition, QRP is simply low power operation, specifically with 5W of RF output or less. In practice it is a large and growing movement within the ranks of amateur radio, a genuine avocation for most, and a way of life for many. At a time when the ham population as a whole has been declining, the QRP fraternity has been growing exponentially, QRP clubs are thriving, and the support industries, like kit manufacturers,

have gone from strength to strength. Believe it or not, a few years from now it will be apparent that in a scant two decades, QRP has grown from being a special interest to become the life-blood and mainstream of the entire hobby.

How can this be? Isn't working with QRP power levels a handicap? Not at all. It's a somewhat arbitrary restriction of the one technical aspect of radio that has consistently worked against the interests of the hobby. Take away power, and you

are left with skill, inventiveness, challenge, and enthusiasm, which are very similar to the attractions of the hobby in its earliest days. It all adds up to Fun with a capital F, and at very low cost.

QRP isn't much of a handicap

The effectiveness of QRP communication, and the

quality of QRP equipment, can be explained very easily with a little math. I hear you groaning, but it is very simple math, and in fact you had to learn it to pass the Novice test. It's called the Power Ratio. Forget about logarithms and focus on the business end of the equation, the received signal. Signal strength is measured in S-points, which you can usually read directly from a meter on your radio. Your concern when transmitting is how many S-points you are generating at the receiving station. The more, the better, right? Wrong. In the first place, if your signal is perfectly copyable at S-7, increasing the strength to S-9 achieves absolutely nothing, except perhaps additional pollution of the airways. And this one is actually engraved in stone, more or less, in Section 313a of Part 97 (the FCC's rules, for those who have forgotten): "An amateur station must use the minimum transmitter power necessary to carry out the desired communications." That says two things. First, if you have a perfectly good QSO going with an S-7 signal, you are *breaking the law* if you increase your power!

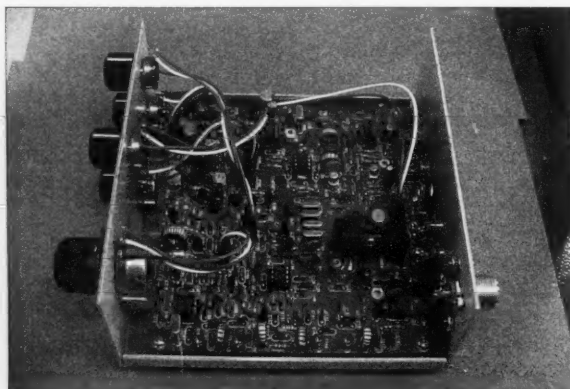


Photo A. Under the hood of a modern 5W single-band CW QRP transceiver—the Oak Hills Research OHR 100A, built from a kit.

Second, if all amateurs complied with the regulation, then *most amateur QSOs would be conducted at QRP power levels!*

Don't believe me? OK, let's look at the power ratio in action. Say you are transmitting with 5 watts and a station gives you a report of S-5. Now *double* your power to 10W and what happens? Your power output has increased by 3dB and the received signal has increased by the same 3dB, which is ... wait for it ... one half of one S-point. Double your power again, to 20W, and the received signal is now one whole S-point stronger. Double it again, to 40W and we are at 1.5 S-points. Again, to 80W and we are at 2 S-points improvement on our original 5W signal. 80W is near enough to what your typical "100W" transmitter puts out, and by now you should see what little difference an additional 20W would make. In summary, by going from 5W to 80W we have increased the received signal strength by all of two S-points. The reverse is true—if you are copying an 80W station at S-9 and he reduces power to 5W, you will still be copying him at S-7.

But let's not leave it there. Start at 100W and add 3 dB at a time by doubling power—you go to 200, 400, 800, then an illegal 1.6kW [that's section 313(b) if you're counting]. We doubled power 4 times, picking up 12dB or ... wait for it ... 2 S-points. Talk about diminishing returns!

But don't take my word for it—try it on the air sometime and see what happens. The only caveat is that the S-meters on most radios, if they are calibrated at all, are set for the standard S-9 at 50µV input—at any other input, larger or smaller, they are notoriously inaccurate. Personally, I think there's a lot to be said for honest reporting the old-fashioned way—in terms of perceived strength relative to other signals on the band—but that's another story for another time.

Money talks, and power walks

It is a generally accepted belief that adding power is simply the *least* effective thing you can do to improve your signal, and that's supported by the

math as we've just seen. But power also equals money, and when you start talking kilowatts you are talking big dollars. Not just for the linear amp, but the antenna, transmission line, and tuner also have to be able to handle the juice. Priced a 1kW antenna tuner lately?

It's probably fair to say that most hams realize how little benefit, relatively speaking, they will gain from investing in a 1.5kW setup. But at the same time, they have trouble coming to grips with the relative performance of their garden variety 100W transceiver as compared with, say, a 5W QRP transceiver.

The entry price for a 100W all-band HF radio is real close to \$1,000 now. You can buy or build a good QRP transceiver for around \$100. That, I suspect, is a major factor in new hams opting to go the QRP route.

Proof of the pudding

It's not in the eating — with QRP, it's in the achievements. Last weekend a friend of mine cranked his "full gallon" 5W transceiver down to QRP levels—250mW output. He worked a station in PA, a distance of around 1,500 miles from Denver, with one quarter of one watt output. That works out to 4,000 miles per watt, and again it works both ways—all else being equal, yes, he could indeed have worked a station in Eastern Europe, 12,000 miles away, with one watt. We do it all the time!

Another friend has worked DXCC at QRP power levels, and is *already* within 10 countries of DXCC 2000. QRP Worked All States is a piece of cake, and I would bet a higher percentage of serious QRPers has done it than the HF crowd as a whole.

Also on the local scene, the Colorado QRP Club stages two separate operations for Field Day. One of them, the "Aloha site," is very laid back and casual, affording new members and other interested parties an opportunity to get on the air, try out their own radios, and generally have fun with no pressure. The other Field Day operation is about as serious as you can get, with towers, wire beams, a high altitude site, and the best operators we can find.

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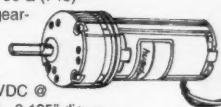
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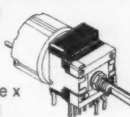
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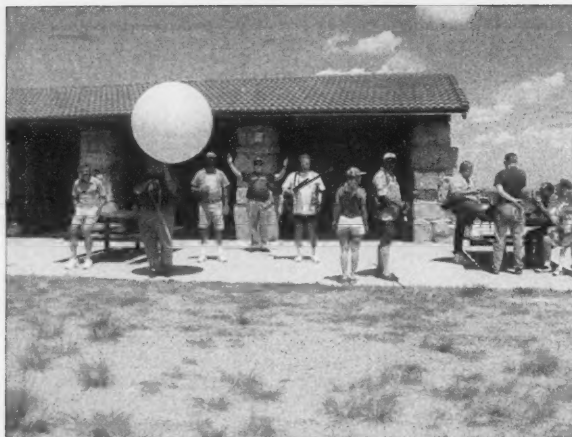


Photo B. The Colorado QRP Club's annual picnic features a "run for the trees" where members take off from the pavilion with whatever equipment they can carry, and race to get a station on the air. The balloon-lift worked.

The result last year was first place in 2-A, the largest category in Field Day. Not only that, we placed seventh overall. Only six out of the thousands of Field Day stations did better—and we did it with 5W.

My own introduction to QRP, within the first 6 months of my ham career, came when a visiting ham suggested I turn down the wick on my FT-101E and "really put my antenna to the test." I succeeded in working a station in the US, from Australia, with half a watt.

All the good gear

QRP equipment can be very simple, but the fact that we are working with

will clearly win more often than not. Surprises hell out of guys who have just mortgaged their XYL to buy the latest all-singing-and-dancing bells and whistles transceiver. But it shouldn't be a surprise, because the biggest part of what you are paying for in the "big rigs" is circuitry to make up for a front end like a barn door. Your typical QRP transceiver is thoroughly optimized for operation on a single band (or a few bands), CW only, and with very efficient signal processing from front-end to headphones. A good rule of thumb, which is proven by QRPers every day, is "if you can hear him, you can work him." And we have better "ears" than many of these guys who can boil water on their linears.

I said CW only, there, didn't I? That's because CW is at the heart of QRP—it's what makes QRP possible as a hobby, and QRP becomes a very good justification for CW. The reason goes back to the math, but perhaps not quite as directly. Let me state this as a fact—all else being equal (operator

lower power circuits means that experimentation and inventiveness are possible for all of us. The QRP equipment industry is thriving, with several kit and accessory manufacturers enthusiastically supported by the market and new gear coming out constantly.

Quality? Can't beat it. Put your \$100 home-built radio next to a \$3,000 Ginzu box and the QRP rig

skill included), CW has an 18dB advantage over SSB. If you read the power ratio stuff earlier, you can see that 18dB is a HUGE difference. That's about the best I can do in terms of math, because ultimately you are comparing apples with oranges, but perhaps I can at least explain the sense of it. A CW signal is either there or it is not, and that's something the ear and brain can detect and work with very easily. SSB transmits the human voice, which consists of a wide range of frequencies and a wide range of amplitude or volume. The result is that the power used to transmit SSB is spread out over a "bandwidth" of a couple kHz. All of the power in a CW signal is concentrated in a couple of hertz. And in SSB, the peak power is used only on voice peaks, which are a very small percentage of the transmitted signal. So the 18dB figure is justifiable, if not exactly measurable (others will quote higher or lower figures, but it's all relative). In practice, especially when conditions are marginal, a 5W CW signal will work better than a 100W SSB signal. And again, you don't have to take my word for it. If you've worked much DX you know that often CW QSOs are possible long before SSB "comes in" and sometimes SSB never quite makes it. Even if you are not a DXer, you should be able to prove this to yourself very easily in half an hour on the air. If you are a real Doubting Thomas, do a real test. Get on the air with a buddy using SSB, and reduce power until you can no longer copy each other. Switch to CW at the same power level, and amaze yourself at how much farther you can reduce your output and still communicate.

As you might suspect, there is not a lot of SSB QRP activity, but there is some, especially since we are experiencing good propagation on 10 and 15m, where there is next to no noise and less power is needed. In fact, a large number of long-time QRP CW operators are turning to QRP SSB as the "next challenge."

There are two other important things about QRP equipment.

First, it tends to be small in size, light, and capable of operation from a small battery. This means it is a natural



Photo C. The Novice/Tech station at CQC's 1999 Field Day made a big contribution to the club's success, racking up over 150 QSOs—all QRP.

for portable operation, backpacking, and even bicycle mobile. Many of us take a complete HF radio station with us when we travel. Including a simple lightweight antenna, the whole kit and caboodle will fit in a briefcase, with room for a change of underwear.

Second, and finally, QRP transmitters are very clean. Again, because we are dealing with low power components, we have very effective filtration of harmonics and other spurious emissions. The result is that a QRP transmitter is far less likely to cause interference to nearby TVs, stereos, and telephones. QRPers are right at the bleeding edge of "stealth radio," many of us living under restrictive ordinances and covenants that might cause someone less dedicated to just give up on ham radio.

The QRP culture

A major factor in the continued growth and success of QRP is the cohesiveness of the QRP community. It is a community in all senses of the word, from local clubs to national organizations, special on-air events, and above all, an enthusiasm for communicating with each other that hasn't been seen in any other aspect of ham radio for half a century.

General radio clubs are dropping like flies, but QRP clubs are cropping

up like mushrooms. There are several organizations with national and international membership, and local QRP clubs in almost every part of the country.

A year or two ago I went to a meeting of a "major" old-fashioned metropolitan radio club, one that has been in existence since the 1930s. They now have a total of 120 members, of which 9 attended the meeting. The program was on "laser printers." The last meeting of the Colorado QRP Club was attended by 50 members. We had a station on the air, and a program related to actual ham radio.

The Internet has been very important to the growth of QRP. Just to give you an indication of how much is available on the I-way, a search for "QRP" on Alta Vista turned up 23,745 page matches.

There is an Internet "Reflector" called QRP-L which has become the main universal communications channel for QRPers. It's like a mailing list,



Photo D. A QRP station capable of working the world will fit in a briefcase.

where a subscriber submits a message which is "reflected" to all other subscribers. At the moment there are something like 3,000 of them, from all over the world. QRP-L is a very good way to get "into" QRP. To subscribe, address an E-mail message to [listserv@lehigh.edu]. The subject doesn't matter. The test of the message should be SUBSCRIBE QRP-L your_name your_call.

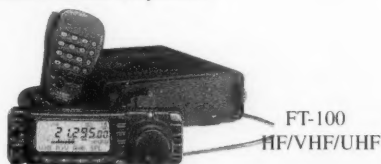
Another good resource on the Internet is the Colorado QRP Club's Web site, which you will find at [www.cqc.org]. You might even think

Continued on page 61

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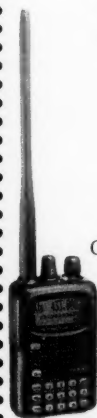
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Exploring the Kenwood TM-D700A

Part 1: Overview and installation.

Trying out new hardware can be fun. Trying out really neat new hardware can be a lot of fun. Having the chance to get my hands on the new TM-D700A radio from Kenwood has been more fun than I've had in a long time.

I had seen the ads and knew that it was a dual-bander that could also handle APRS, packet, HF SkyCommand™, and SSTV, but until I got my hands on it, I didn't have a clue as to how many features could be packed into such a small box. The advertisements for this radio have been understated, but I guess there's just so much even marketing experts can pack into a single ad. In fact, this radio has so many features that it's going to take two issues to tell you about all of them.

This month, I'll concentrate on the dual-band FM voice transceiver and its installation. Next time, I'll focus on its ability to function in advanced modes and capabilities, including packet, APRS, and slow scan TV (SSTV).

In my early days as a ham, the more features a radio offered, the larger and heavier it became; the more horns, bells, and whistles, the more knobs, buttons, and gauges. In the case of the TM-D700A, the physical hardware does not hint at everything this radio is

The main unit measures 5.51" x 1.57" x 7.68" and weighs about 2.6 lbs.—fairly typical for a modern transceiver. It has two modular connectors on the front, one for the microphone and the other for the cable that connects to the control panel. There is a DB-9 socket to permit the connection to the serial port of a computer, and a mini phone jack which can be connected to a Global Positioning Satellite (GPS) receiver. There is also a 6-pin DIN connector for connection to an external TNC or video. On the back of the rig are the SO-239 connector for the antenna, the power cable, and two jacks for speakers. There is a mounting bracket included for mobile installation, and rubber feet if it will be used in a fixed location.

capable of. When I opened the box I found the actual radio, a control panel, the microphone and all of the cables, brackets, and the hardware needed to install it (**Photo A**). With the exception of the separate control panel, there was nothing that even hinted at how much I would be able to do with the TM-D700A.

The control panel is about the size of a handie-talkie, measuring about 5" x 2" x 1" and weighing just over 6 ounces. It has three knobs, a dozen buttons, and an LCD display. Only the power button has a label. It also comes with a unique swiveling mounting bracket into which the control panel can be slid or removed easily. The microphone has four function buttons, the DTMF-type push-buttons, and, of



Photo A. The Kenwood TM-D700A comes complete with main unit, control panel, MC-53DM programmable microphone with alphanumeric keys and all necessary cables, brackets, and hardware. It even includes the cable for connection to a GPS receiver.

course, the push-to-talk button. Nothing looked too intimidating, so I decided to charge ahead.

I admit that I picked up the manual, but fortunately Kenwood has a "Quick Start" section for those of us who tend to run short on patience when we've got a new toy. I connected the microphone, control panel, and main unit together, added an antenna, and connected it to my power supply. The control panel lit up with a welcome message and then switched to a display that indicated 2 meter FM on the left and 440 MHz on the right. The orange backlit screen was pleasant to look at, and each of the buttons now had a label on the LCD screen to explain its function. The frequency display is large and very easy to read; the function labels a little smaller, but still very plain. The contrast (which is adjustable) is excellent on this display, which is important since, as I would find out, there is a lot of information this will provide. Naturally, I immediately tuned it to my favorite local repeater to try it out just to make sure it worked. While this is not

a scientific test, and there's not a lot you can tell by doing that, it's a time-honored ritual every ham has to complete with every new rig. Once I was convinced that it was working, I began to explore what it could do and how it could do it.

The large knob at the bottom left of the control panel could be used to control the VFO or, when in memory mode, to change memorized channels. The two knobs on the right each controlled volume with the inner knob and the squelch level with the outer collar. By pressing the left knob, the left display became larger, indicating that it would be transmitting when I pressed the push-to-talk button, and I could switch to the frequency displayed on the right by pressing the right knob. It is very convenient to be able to switch bands and/or frequencies in such an intuitive manner. In fact, the more I learned about this rig, the more I was struck by how logical all the controls worked. It was time to read the manual and plan the installation of this rig into my car.

Mobile installation

Usually the biggest problem with a mobile installation is the need to find a location that is safe and convenient, and doesn't require that you be a contortionist to implement. With the TM-D700A, there are options not available for most units. The main radio unit has a mount that lends itself to being located in a number of out-of-the-way locations. It can be trunk-mounted, for example, either on the floor of the trunk behind the rear seat or under the shelf beneath the rear window. I have seen some installations in vans which used the space under the driver's seat, so I decided that I would mount the main unit under my car seat so that the microphone was accessible through the gap between the driver's side of the bench and the passenger's side. Generally, if I can mount a radio out of sight, it makes me feel more secure, and this not only hid the main radio unit, but also I could tuck the microphone under the armrest to hide it.

The control panel can be mounted virtually anywhere that is convenient. I toyed with locating it above the rear

Frequency Range (MHz)	
VHF	144-148
UHF	438-450
Receive Range (MHz)	
Band A	136-200
	118-136
	300-400
	400-470
Band B	400-524
	136-175
	800-1300
Power Requirements	
Receive	1.0 A or less
Transmit (max)	11.5 A or less
Transmitter Power Output	
Low	Approx. 5 W
Medium	Approx. 10 W
High (VHF)	50 W
High (UHF)	35 W

Table 1. TM-D700A specifications.

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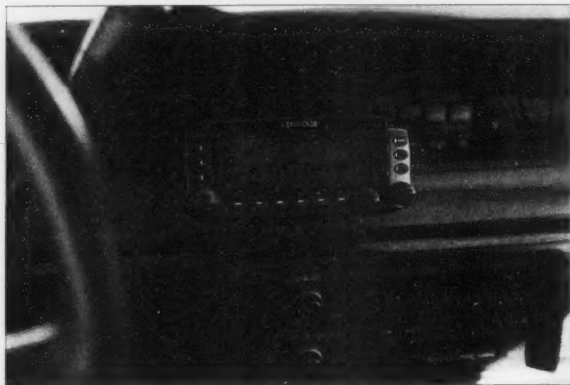


Photo B. The control panel's light weight allows it to be mounted almost anywhere. It is easily removable to discourage would-be thieves.

view mirror or on an open section of dashboard to the left of the steering wheel. I finally settled on mounting it to the right of the wheel where it is readily visible except when the gear-shift lever is in reverse. Since I try to avoid complex radio operations while driving, and especially while driving in reverse, this seemed an appropriate location. I affixed the unique control head bracket to the dashboard and adjusted the angle of the display to ensure adequate visibility (**Photo B**).

If you prefer to install the main radio in the trunk or other remote location, Kenwood has cable extensions available to make this easy. To avoid confusion, all three modular plugs are configured differently. The microphone uses an 8-pin connector, and the interconnecting cable uses 6 pins at the main unit end and 4 pins at the control panel end. In any case, with this design, the main unit can be placed in a hidden location and the control panel can be removed when the vehicle is unattended. The control panel can easily be slipped into a briefcase, purse, or large pocket. Since Kenwood has made no secret of the fact that they do not sell replacement control panels, they have done their part to frustrate would-be radio thieves. Incidentally, adding a new rig to your car is an excellent time to review your insurance to make sure your radio is covered in the event of theft or damage. Many standard automobile policies do not cover ham radio equipment, so you may find it advantageous

to look at a specific policy to cover your amateur gear.

With the dual-band capability, Kenwood gave appropriate thought to connections. There is an internal speaker on the main unit into which the audio from both bands is fed. When installed in a remote location, such as in the trunk, an external speaker is

obviously required. Kenwood has made it possible to use the internal speaker, one or two external speakers, or a combination of internal and external speakers. If you run voice communications on both bands, you will have different requirements than someone who operates voice on one band while using the other for digital communications.

After I was satisfied with the installation, I began to program in the local repeater frequencies. There are 200 memory locations, so I was able to program in the local 2 meter and 440 repeaters, common simplex frequencies, and key digital frequencies as well as repeaters in areas where I might travel. When I have the memory capacity available, I tend to group frequencies so I can follow my own logic later on. For example, I might use memory locations 1–20 for local 2 meter repeaters, 21–40 for local 440 MHz, 41–60 for areas I visit, etc. In this way, I can overwrite out-of-area memories when necessary. With 200 memories, this is easily done. In fact, the radio is set up so that each of these blocks of 20 frequencies comprises a group and you can choose to monitor any individual group. To make it more convenient, memories can be stored with labels so you immediately know key details about the frequency. If you travel a lot, for example, the ability to indicate a city and a code such as "W" for a Skywarn repeater, "A" for ARES/RACES, etc. is very helpful. I also like to store a few frequencies for receive-only, such as the local NOAA weather

radio and perhaps the tower frequency for the local airport. You can lock these out so they are not scanned, but can be accessed manually when needed.

Incidentally, there is now a software program that is available on the Internet either through the Kenwood Web site or [<ftp://ftp.kenwood.net>] which will allow you to load all of the memory functions from your computer into the TM-D700A. This can be done with any Windows 95 or 98 system and a standard DB9 cable. The program is currently in beta test, so by the time you read this, it should be well established. With this program, you can set up different configurations for traveling for each city where you might expect to operate, and load these files easily and conveniently.

Now that I had a few of the basics out of the way, I decided to sit down and thumb through the manual. It was then that I realized that I had not yet even scratched the surface of what this radio could do. Actually, there are two manuals, one covering regular communications and one addressing specialized communications. Both manuals are available on-line at [<ftp://ftp.kenwood.net>], so you can read up on all the details of the radio if you are so inclined.

One key bit of advice included in the manual is that if you tend to throw manuals out with the packing material — DON'T. Although this radio is very logical and almost intuitive, you'll find out that you need to refer to the manual on occasion, especially since there are many features you will be growing into. The FTP site has PDF copies for all current Kenwood radios. Not only does this allow you to read up on a product before buying it, but you'll never have to buy a spare or replacement manual again!

The basic features are laid out in front of the operator in such a manner as to make operating a joy. Designate one frequency as your "Call" frequency and you can jump to that frequency with a single press of a button on the front panel or the microphone. The same can be done to switch between memory and the VFO. There are six buttons along the bottom of the

Continued on page 61

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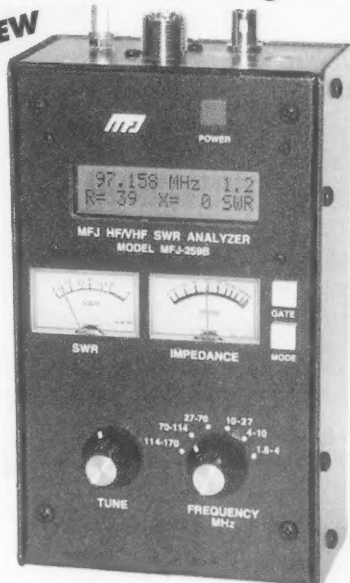
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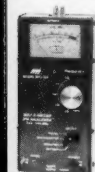
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Build and Compare

Learn about receivers from these two simple designs.

There are many excellent sources of information on HF receiver design available in books, periodicals, Web pages, and amateur radio's vibrant oral tradition (tales of questionable provenance). While the books occupying the several feet of shelf space I have devoted to this topic have been read cover-to-cover any number of times, nothing drives home a concept like the success or failure of experimentation. These two receivers are born in part from this desire to experiment, mixed with the fun of construction and the pride of using home-brew equipment.

The two radios meet different needs. The 31 meter broadcast band is my workbench companion, where I regularly listen to a variety of programming from Radio Canada International, BBC, Deutsche Welle, and Radio Netherlands while the soldering iron is hot. One radio is dedicated to this. The other is an auxiliary unit used to look for 20 meter activity while "the real radio"—my Drake R8—is busy doing something else, like receiving slow-scan.

Desirable features and functionality requirements common to both include:

- Must use readily available or easily made parts, preferably ones already on hand.

- Must fit on a single 3" x 5" single-sided PC board suitable for mounting in my favorite kind of enclosure.

- Should be a simple mechanical design—no critical parts placement, few controls. My mechanical ability is generally limited to drilling holes.

- Should have minimal dynamic range requirements. Unlike 40 meters, where broadcasters and amateurs intermingle with widely different signal strengths, 31 meters is broadcast only, while 20 meters is amateur only.

The 20 meter rig has a few more stringent requirements:

- Must be stable enough to receive CW and SSB.
- Must have enough tuning resolution

to select relatively closely-spaced stations (whereas spacing is typically 5 kHz on 31 meters).

31 meter design

Fig. 1 is the 31 meter block diagram, and Figs. 2 and 3 the schematic.

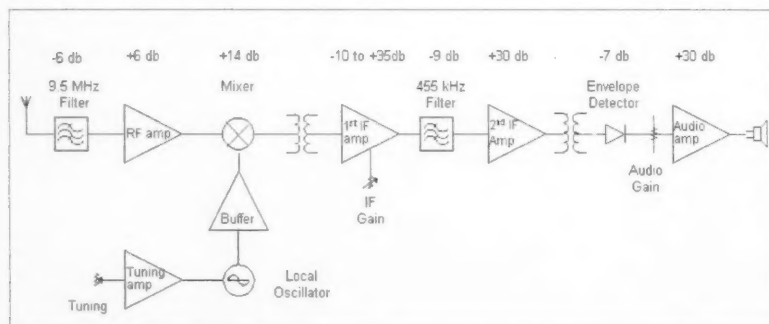


Fig. 1. 31m receiver block diagram.

31 Meter Parts List		
U1	NE602A double balanced mixer/oscillator	Philips
U2	LM1458 dual op amp	National
U3, U4	MC1350 IF amplifier	Motorola
T1	455 kHz IF interstage xfmr	Toko 7MC-452252NO
T2	455 kHz IF output xfmr	Toko 7LC-352713NO
FL1	455 kHz ceramic filter, 6 kHz bandwidth	Toko HC FM2-455B
L1-L3	1 μ H adjustable inductor	Toko BTKXNS-T1050Z
D1, D2	MVAM108 varactor tuning diodes	Motorola

Table 1. 31m parts list.

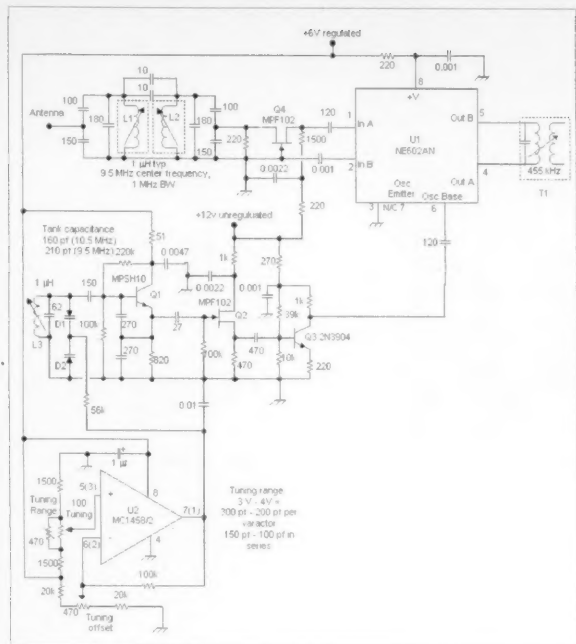


Fig. 2. 31m receiver local oscillator and mixer.

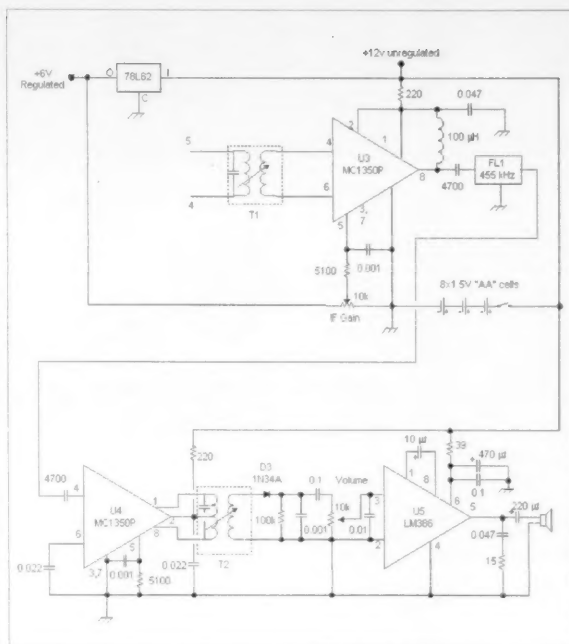


Fig. 3. 31m receiver IF and audio sections.

Common-gate RF amplifier Q4 overcomes the loss of the RF bandpass filter to feed the RF input to mixer U1. Local oscillator Q1, buffered by Q2 and Q3, supplies U1 with the local oscillator signal. The tuning voltage for the two varactors in Q1's tank is generated by one half of U2, which amplifies the rather small voltage change developed across the 100Ω 10-turn tuning pot.

RF and LO signals are converted by U1 to 455 kHz, and coupled through T1 to U3, the first IF amplifier, whose gain varies up to a maximum of about 35 dB according to the IF GAIN control setting. The output of U3 passes through the 6-kHz-wide filter to U4, the second IF amplifier. Transformer T2 couples the IF signal to the low impedance of envelope detector D3, in turn driving audio stage U5 through the volume control.

Eight "AA" batteries provide 12 V power. U6 produces +6.2 V regulated for the local oscillator itself, the local oscillator tuning amplifier, and the mixer. Current drain is about 60 mA at a reasonable audio level.

20 meter design

The antenna is coupled through a two-resonator preselector network to

mixer U1, driven differentially through the secondary of T2. The local oscillator circuit is much simpler in this receiver, relying on a transistor internal to U1. The 30k 10-turn potentiometer available when this unit was built allows for sufficient varactor tuning voltage variation without the need for an amplifier. Q1 is an optional buffer amplifier used to isolate the local oscillator from an external frequency display I occasionally use.

First IF amplifier U2 drives a crystal filter through T3. T4 couples the filter's output to second IF stage U3. The gain of both stages is controlled by a 5k potentiometer. U3's high output impedance is transformed by T6, a standard 10.7 MHz IF transformer tuned up slightly to 10.9 MHz, nearer to 50Ω for input to double-balanced mixer module U4. A crystal-controlled

Continued on page 20

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Photo A. 31m receiver.

oscillator (see Note 1) provides about 0.5 Vrms to U4's local oscillator port.

The 51Ω resistor at U4's output port is required to provide a reasonable match both at audio frequencies and at the 21.8 MHz image frequency. The two sections of U5 provide audio gain and audio bandpass filtering (see Notes 2 and 3). U6 provides final audio power gain.

Design decisions: Demodulator

I would have preferred a synchronous detector for the AM receiver, but in the interest of simplicity, I chose to stay with the envelope detector, which is quite adequate. For the 20m receiver, I chose the double-balanced diode mixer rather than a Gilbert-cell entirely because I wanted to build a receiver using a hybrid DBM in this role.

Another NE602A could have been used here, as I have done in subsequent designs.

Overall gain

There are no IF interstage transformers in the 31 meter receiver, and as a result, lower overall gain because of increased loss incurred by impedance mismatches around the ceramic filter. This is entirely outweighed by the large signal strength of broadcast stations.

IF section

The "keep it simple" mantra weighed most heavily on the 31 meter design, where I felt having images in the input tuning range was a minor price to pay for using cheap, commercially-available coils and filters for 455 kHz.

On 20 meters, a narrower bandwidth than could be had with cheap ceramic filters was needed, and images would have been more of a problem, so a crystal filter was built. The major concern here was finding three crystals suitable for the filter and the BFO. The filter is slightly tunable by varying the surrounding capacitors, and the BFO may be tuned by pulling the crystal with the 20–125 pF trimmer. Both tuning ranges are small, though, and indeed, quite a few crystals were tried before the magic combination was found.

Coils and transformers

The 20 meter receiver does indeed have six home-made coils: two solenoids and four toroids. The three toroids surrounding the IF section allowed a good match into and out of the crystal filter, and allow the mixer and both IF amplifiers to run balanced. These are used for wideband impedance matching: The impedance ratios are somewhat important, but they are not frequency-determining components. Toroid transformer T5, which couples the BFO to the product detector, is part of a tuned circuit, but is only a frequency determining component in that the crystal must oscillate at its fundamental rather than a harmonic.

Lessons learned

Building and comparing these radios gives an appreciation for why the literature stresses certain characteristics at both the architectural and detailed

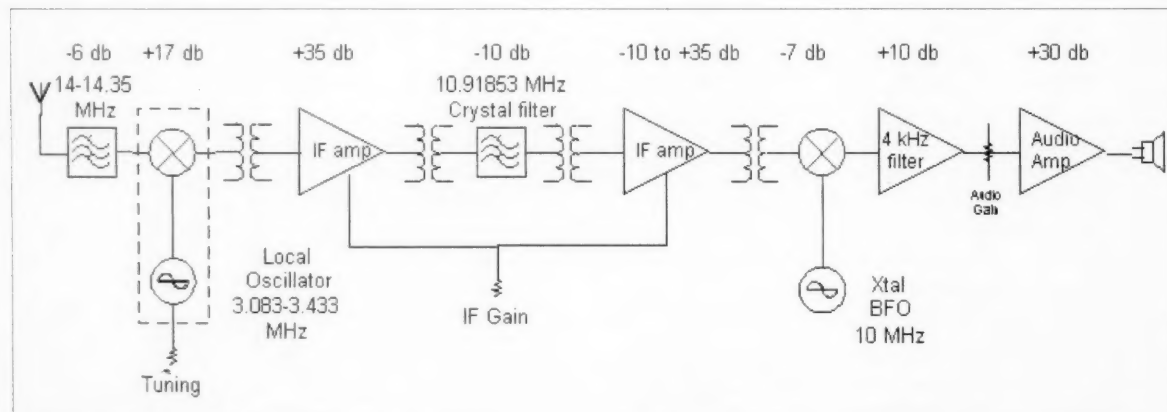


Fig. 4. 20m receiver block diagram.



Photo B. 20m receiver.

circuit levels. At the same time, it shows how narrowing the range of re-

quirements affords greater leeway in design than would be appropriate for the radio, which must be all things to all people all the time. Here are some of the lessons learned:

1. Images. While a 455 kHz first IF is clearly an invitation for images when covering 1 MHz of RF, it's not the only concern. The AM receiver could have used a crystal filter, too—with two crystals, the response doesn't seem overly sharp.

2. Coils. Winding the home-made coils was not such an awful chore. The toroids are self-shielding (provided the leads are kept short), and can be wound to whatever configuration is needed in terms of taps, number of windings, and impedance transformation.

3. Demodulator. Receivers using only one hybrid diode mixer should use it as the first mixer rather than squander its excellent characteristics as a demodulator.

4. Local oscillator. The NE602A's internal oscillator functioned quite well. It was sufficiently stable for SSB reception on 20 meters, and reduced the component count considerably over the separate oscillator/buffer used on 31 meters, where the stability requirements of AM are more lax anyway!

5. Mechanical. IF gain is sufficient in both receivers to be problematic. Even though this is not a construction article, those oft-repeated tips about RF mechanical layout cannot be over-emphasized, in particular:

- Place bypass capacitors close to the chip.
- Avoid sockets.
- Surround the chip with as much

20 Meter Parts List

U1	NE602A double balanced mixer/oscillator	Philips
U2, U3	MC1350 gain controlled RF amp	Motorola
U4	SBL-1 double balanced diode mixer	Mini Circuits
U5	LM1458 dual op amp	National
U6	LM386 audio amp	National
T1	Toroidal xfmr: 85 μ H primary, 45 μ H secondary	Home-made
T2	Solenoidal xfmr: 0.82 μ H primary, 1:1 turns ratio	Home-made
T3	Toroidal xfmr: 185 μ H center-tapped primary, 20 μ H secondary	Home-made
T4	Toroidal xfmr: 86 μ H primary, 150 μ H secondary	Home-made
T6	10.7 MHz xfmr: 4.3 μ H primary, 7:1 turns ratio	Toko 154AC-470072NO
L1	10 μ H adjustable coil	Toko BTKANS-9439HM
X1, X2	10.91685 MHz crystals. Other closely matched crystals between 10.5 MHz and 11 MHz may be used.	Your choice

Table 2. 20m parts list.

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LAB-4	2.0	2.0	1.0	4.00
LAB-5	2.0	4.0	1.0	4.75
LAB-6	2.0	6.0	1.0	5.50
LAB-7	2.0	2.0	1.5	4.10
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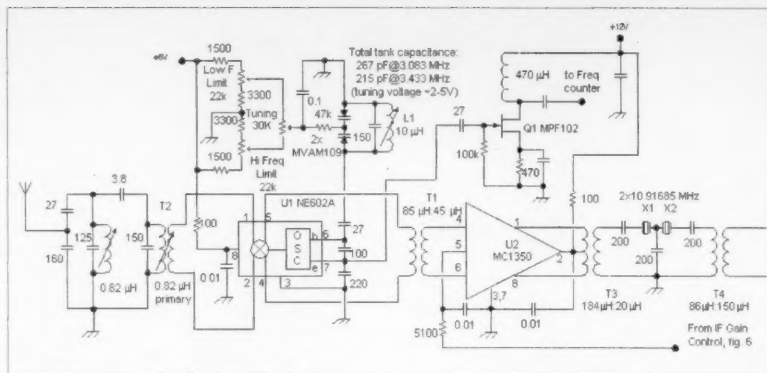
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d. While toroid transformers are self-shielding, the leads are not, so keep them short. Keep as much ground foil beneath solenoidal transformers as possible, connecting to the shield to ground, to minimize magnetic coupling between IF transformers.

6. **Audio gain.** Too much audio gain can be a bad thing. Power supply decoupling is more difficult at low audio frequencies than at RF. Make sure the low frequency response of the audio stage(s) (determined by coupling capacitors and filter components) is not too low. Motorboating—or even worse, subaudible oscillations that propagate to other stages—can result.

7. RF amplifier. Isn't needed at these frequencies using an NE602 front end. I experimented by removing Q4 from the 31 meter rig and connecting the tap, its base, directly to pin 1 of the mixer, with no difference in selectivity or image rejection. The other radio feeds the NE602 differentially, and this does seem worth the effort.

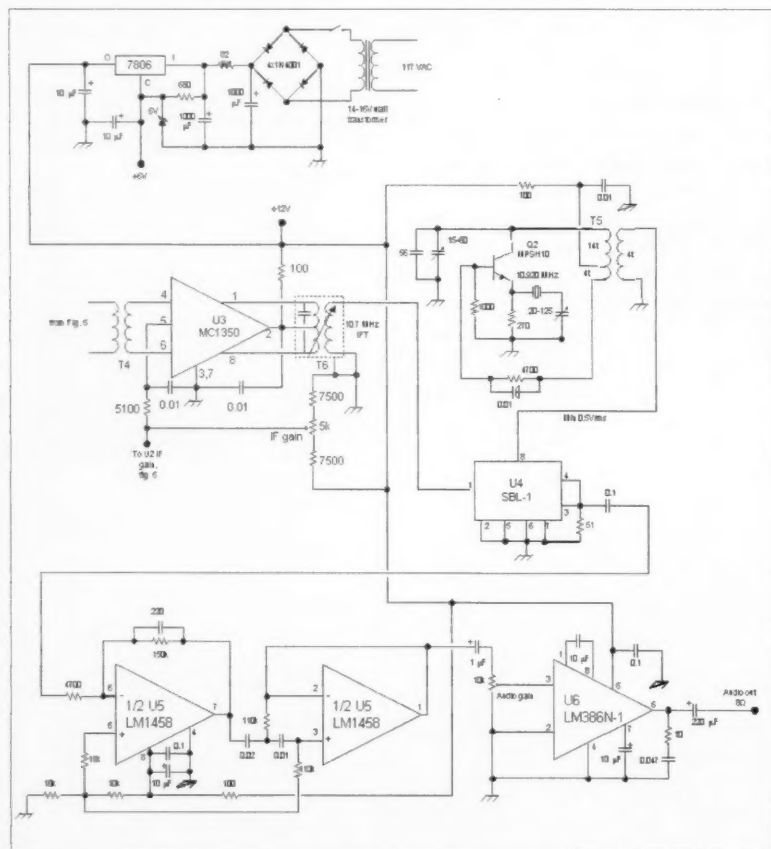


These two radios offered a testbed for experimentation and comparison, from which I learned much. And it's amazing how much more I now appreciate a shelf full of receiver design books!

1. A table of suitable values for this oscillator for frequencies between 3.3 and 26 MHz is provided on pages 30-11 and 30-12 of *The ARRL Handbook for Radio*

2. Low-pass first stage: Application note AN-20, *Linear Applications Handbook*, 1994, National Semiconductor Corporation, Santa Clara CA.

3. High-pass second stage: Rudolph H. Graf, *Encyclopedia of Electronic Circuits*, Volume 1. 1985, Tab Books, p. 296.



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Key Features Summary		
	31 Meter Receiver	20 Meter Receiver
Signal type	AM	CW/SSB
Demodulator	Diode envelope detector	Double balanced diode mixer product detector
Input frequency	9–10 MHz	14.0–14.35 MHz
Overall gain	93 dB	104 dB
IF filter	Ceramic	Home-made crystal
Coils	Commercial solenoidal	Home-made toroids; commercial and home-made solenoids
IF	455 kHz	10.918 MHz
Local oscillator frequency	9.455–10.455 MHz, high side	3.083–3.433 MHz, low side
1st mixer image frequency	9.91–10.91 MHz	7.485–7.835 MHz

Table 3. Summary of key features.

QRP with the OHR 500

Missed out on building an HW-9? Here's the next best thing.

The pathway to my current Extra Class license has a huge gap in it. As an avid SWLer and wannabe ham, I suspended operations in 1961, without an amateur license, in order to chase girls, run track, score touchdowns, pursue academics (yes, I was one of those), and generally be a big man on campus. That was high school. Then came college, the '68 convention, investigative journalism, and kids, lots of them. About 34 years later, when the youngest of four children was safely on a path toward high school graduation, I bought myself a nice shortwave receiver. Thirteen months later, I had the Extra ticket and found myself on a dead run in the midst of ham radio, as if those three decades plus had never transpired.

But I had, in fact, missed a few things. Like several solar cycles, some so hot that you didn't even have to turn the rig on to work Fiji — or so some hams have claimed.

I also missed the entire Heathkit era. Totally. I had built a Knight kit receiver way back when, but had never set any Heathkit parts aflame with a soldering iron.

When I returned to ham radio in 1995, I immediately fell under the questionable influence of a growing crowd of ham radio radicals — QRPers. I never went QRO, and haven't regretted it one bit. For one thing, I found that the QRP crowd was busy building their own rigs. There were even kits available. My first rig was an Oak Hills Research Sprint for 40 meters, purchased used off the Internet. I bought an MFJ tuner and some magnet wire from Radio Shack. A key, a set of earphones, and a battery, and I was on the air. Boy, was it fun.

From there, I bought and sold all sorts of used rigs — to catch up on those lost years — and then started building rigs.

What I truly missed was the chance to build any one of Heathkit's groundbreaking QRP rigs, the "hot water" 7,

8, or 9. I've used them and owned them, just by trading in the used gear market, but I was never able to build one of my own and then put it on the air.

However, I have found the next best thing — the OHR 500 from Oak Hills Research — a five-band CW rig that just about makes you think you've put together your own HW-9. Other than the nostalgia value, the OHR 500 offers superior performance to even the stock HW-9, although it includes only one of the WARC bands — 30 meters, the key one, if you'll excuse the pun. The only other WARC band I'm interested in is 17 meters, for the DX, but believe me, the lack of that band is a tiny price to pay for such a terrific radio. And a radio you get to build yourself, put your name on, and use to start racking up rag-chews, contest scores, or DX contacts.

The OHR 500 is the natural evolution of finely crafted kit rigs from Oak Hills

Research, founded in Michigan by Doug DeMaw W1FB, developed further by Dick Weitzke KE8KL, the designer of the OHR 500. The company is now owned by Colorado's own Marshall Emm N1FN/VK5FN, of Milestone Technologies, Inc., more well known as Morse Express. Some of the Oak Hills history includes a number of single-band rigs, the dual-band OHR QRP Classic, the 4-band OHR 400, and now the 5-band OHR 500.

The transmitter

The rig is rated to kick out a full gallon of QRP power: 4–5 watts on 80,

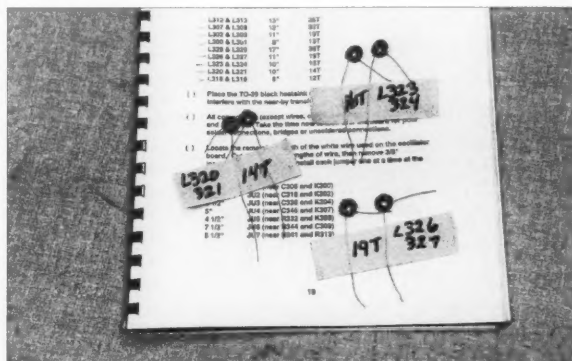


Photo A. Prewound toroids with labels.

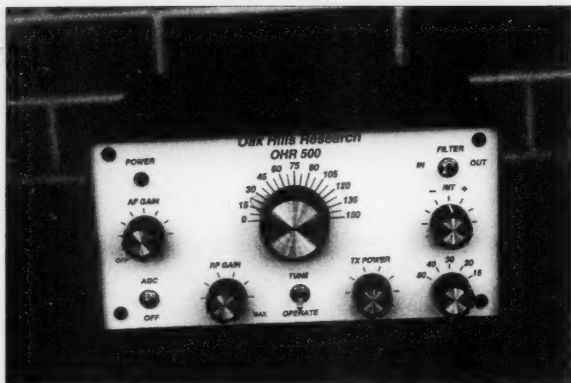


Photo B. The OHR 500.

40, 30, and 20 meters and 3 watts on 15 meters. What it does is give you up to 7–8 watts on 80, 5–6 watts on 40, a solid 5 watts on 30 and 20, and the advertised 3 watts on 15. One thing we QRPers love is the ability to easily control power output. The OHR 500 places the power output control right where I want it — on the front panel — giving me continuous power setting control from zero to maximum output. With my matching Oak Hills WM-1 wattmeter, I can quickly adjust my power to QRP levels. Coupled with the front-mounted Tune/Operate toggle switch, I can rapidly adjust power out when I switch bands. So if I want to operate in a contest, for example, at 250 mW or 950 mW for those power multipliers, I have no trouble resetting the output when 15 meters goes dead and I jump to 20 meters.

The QSK is smooth. And you can adjust both the volume and the tone of

the sidetone generator to match perfectly just how you want it to sound. Both of these adjustments are inside on one of the circuit boards.

The receiver

The receiver is a single superhet design with an RF preamp, a TUF-1

diode ring mixer, a selectable AGC circuit with a manual RF gain control, a four-pole crystal ladder filter, and a selectable four-pole audio filter. The VFO, which utilizes an air-variable capacitor (you old-timers should remember what that is), covers 150 kHz on each band. The funny noises that emanate from the receiver are sweet, melodic, and easy to copy. The superhet does a terrific job of suppressing everything but the signal you want to hear. Even the faintest CW signal is readable above the noise floor, which already has proven ideal for QRP contests when I am trying to dig out those barely audible signals — signals, incidentally, which I cannot hear on my TS-570 because its front end is so broad, and it is so noisy. This ability to dig the weakest signal out of the noise is one aspect of the OHR 500 that reminds me a bit of a Collins 75-S3 I once owned. While I admit the

comparison might be pushing it a bit, I can honestly say that the difference between the two is only slight.

For exceptionally noisy band conditions, the four-pole audio filter does kick the level of the CW signal up considerably by filtering out some of the QRN on either side of the signal. Also, the AGC

circuit does a fine job of equalizing the signals across the band. This feature is especially helpful during contests, when signal strength is all over the place. The AF gain and RF gain can be set high to capture weak signals, but your ears aren't pierced when you tune by a 30 over 9 signal. And for the pileups, congested contest band segments, and managing QRM, the RIT lets you move the receive signal plus or minus 1 kHz. Output jacks on the back of the rig provide options for headphones and an external speaker.

Construction preparation

Before taking inventory of the parts, I checked to see what sort of tools Oak Hills Research recommended for the OHR 500. All that's required are the basics: long-nosed pliers, a regular set of pliers, a good wire stripper, a medium Phillips screwdriver, a .062-inch Allen wrench, a smaller hammer, a 25–30 watt pencil soldering iron, a ruler, a magnifying glass, and a magnifying light. You'll also need a frequency counter that can read up to 30 MHz signals, a digital voltmeter, and a station transceiver for alignment. The kit comes with a plastic tweaking tool to adjust trimcaps and trimpots.

The manual suggests that a desoldering bulb and braid are “useful to have.” Well, “useful” is an understatement. I'd say having some fresh, high-quality desoldering braid available is essential. I heated up a lot on this project. Don't get your desoldering braid at your local Radio Shack, unless there is no other way. There's no telling how long the stuff has hung on the rack, and there is a strong likelihood that the flux has dried out. I'm lucky enough to have the old TechAmerica store, now called RadioShack.com (essentially a Radio Shack store on steroids), within walking distance. They carry good, fresh desoldering braid. So check with your local electronic supply store or order some high-quality desoldering braid over the Internet. I also keep a flux pen handy to wipe onto a little strip of desoldering braid just before I use it. Also, once you have desoldered, clip off the braid section that contains the old solder, plus

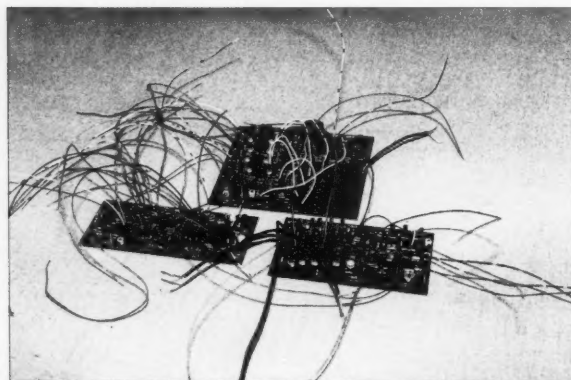


Photo C. The completed boards, ready for chassis assembly. Top: T/R board. Bottom left: Receiver board. Bottom right: Oscillator board.

another half-inch. The heat probably evaporated the flux in that extra half-inch. By cutting it off, your next desoldering move will be at peak efficiency.

Oak Hills recommends using rosin core solder with 60:40 tin:lead content for the kit. That's what I used, and nothing fell off the board afterward.

I start any project with a parts inventory. Every builder seems to have his or her own approach to this. One approach is to identify and label the parts and stick them all into Styrofoam. Another is to lay the parts out, side-by-side, place a long piece of masking tape over them, then label the part on the masking tape. I've used variations on these approaches. What I often do now is to separate the parts by type and place them in plastic trays. These can be the trays that come with built-in compartments, the plastic trays that microwave dinners arrive in (wash them out first, though), or the plastic lids to pint containers. Then I take the most annoying parts piles — the resistors and capacitors — and sort them out by their values, arrange them neatly on the workbench and then place masking tape across their leads. Then I label them, and tape them up somewhere. There were no parts missing from the OHR 500 kit. And for the few times I thought I had a missing part, the culprit appeared after another search.

The manual

There are several nice features offered by the OHR 500 manual.

The instructions use a traditional step-by-step approach to construction, limiting you to stuffing no more than a half-dozen parts before you apply solder. A little bracket lets you check off each step as you proceed. Just like my old Knight kit, and just like those fine Heathkits I never got to build.

The appendix includes a useful parts pictorial, so you can easily figure out what some of the parts look like. You'll also find good illustrations showing how the chassis and case are assembled, and where all the controls, switches, pots, and jacks go. Also included is a detailed board-by-board parts list, a comprehensive schematic, parts overlay

diagrams for each board, and a valuable, well-illustrated full page on how to wind the toroids.

Construction

I also like to get the toroids out of the way early, so I read ahead in the manual, sorted out all the cores and wires, and started winding. I usually cut the wire an inch or so longer than what is specified in the instructions. There are quite a few toroids to wind in the OHR 500, but I follow an approach suggested by fellow Colorado QRP Club member Jim Pope KGØPP, who wraps toroids while watching television, and doesn't worry too much about the winding count until later. I do the same now, and it works quite well. It's a great thing to do while watching a football game or some other form of enjoyment via the tube. I usually count the turns in groups of five. I'll place several objects nearby

— coins, a set of keys, a pencil, etc. — and each time I finish five turns, I set one object into a little pile on the couch. If it's a 27-turn toroid, I quit after I have five objects in the pile, then add two turns and label the toroid with masking tape. I recount the turns under a magnifying glass. It makes life easier. The fingers get a little sore, though.

The three printed circuit boards that come with the kit are double-sided with plated-through holes — very solid. They include an oscillator board, receiver board, and the T/R board, which I assembled in that same order. Assembly is

routine from this point on. When explanation is required, such as how to prepare a piece of wire or how to align the bandswitching relays, it's included

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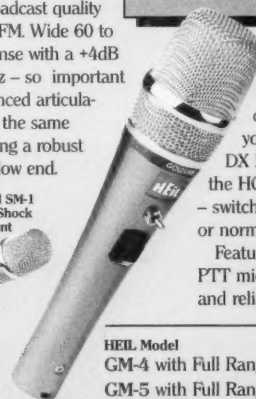
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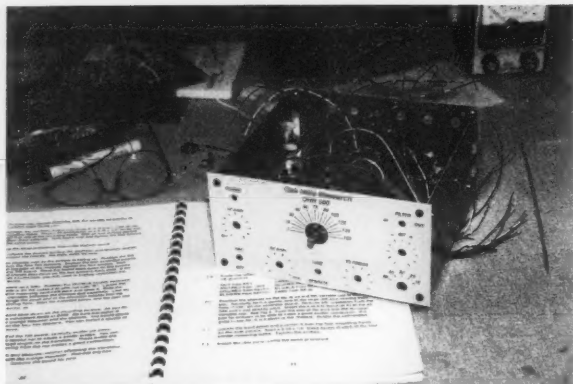


Photo D. Mounting the finished boards inside the box.

in the relevant installation step. The book does take you by the hand through the project quite nicely. I just followed the steps, inserting a few components into their respective holes, turning the board over, soldering, and then checking the solder joints with a magnifier.

Oak Hills recommends taking your time with this project, and I agree. You could build the rig in a long weekend, but you wouldn't want to go to work on Monday morning. Well, not that you want to go anyway. But you'd want to "not go" even more. I logged my time on this project, and found that it took me about 6 hours to build the oscillator board, 5 hours for the receiver board, 10 hours on the T/R board, 4 hours for chassis assembly, and 1.5 hours for alignment. Add to that about 3 hours for toroids, and I come up with 29.5 hours for the total construction project. Let's call it an even 30 hours.

chassis design makes this work fairly simple. What you are doing in this stage is connecting the circuit boards to each other and to all the controls and jacks mounted on the front and rear of the rig.

Alignment

Once the chassis is assembled and all wired up, it's time for the first smoke test and then alignment.

The alignment procedures direct you to set the controls a certain way, and switch the rig to 15 meters. When you apply power to the rig for the first time, you should get a red LED on the front panel, and no smoke. At least that's what happened to me. Knock on wood.

Next, I attached my QRP wattmeter to the antenna connector and screwed on the Colorado QRP Club's kit-built dummy load onto the output connector on the back of the wattmeter. Then I attached my frequency counter to test

One of the trickiest parts of the project is when you do the chassis assembly. What you have is three fully populated circuit boards with seemingly a million color coded wires sticking out of them. Well, the color-coding is the key, along with a little patience. The sturdy

a few other tuning adjustments for each band.

In the next step, you adjust a pair of trimcaps for each band to obtain maximum power out. This is where I ran into trouble. I'll cover this a little further on.

In the final alignment steps, you connect an antenna, tune in a CW signal, and then adjust one trimcap so you are hearing a 600–700 Hz tone — make sure you are on the high side of the CW signal. Then, using your station transceiver, set the transmit offset.

Finally, you adjust the pitch and volume of the sidetone.

And then — BAM! — you're on the air!

Well, not for me. Back when I was adjusting the transmitter for maximum power out, I simply wasn't getting it. I also wasn't hearing anything. After about a day's worth of troubleshooting, I packed up the rig, enclosed a check for \$75, and sent it off to the former Oak Hills owner, Dick Weitzke, who aligns the rigs under contract with the new owner of the company. Dick laid hands on my OHR 500 and sent it back with a nice little note. I had messed up the two transformers, and he found a solder bridge. Things like this happen, and I wasn't too bummed about it. Only three boo-boos out of so many possibilities.

On the air

I placed the OHR 500 on the air during a Monday night Spartan Sprint sponsored by the Adventure Radio Society. I knew there'd be plenty of QRPers messing around on a few bands to help out.

Well, one thing I noticed was that it seemed as though I was not getting heard too well. I'd call and call and call at the full five watts and get nothing back. I wasn't too used to this, even at QRP power levels. I did manage to work Ed WE6W in California and Doc KØEVZ in North Dakota. But I had the nagging feeling that I wasn't right on frequency. That same evening,

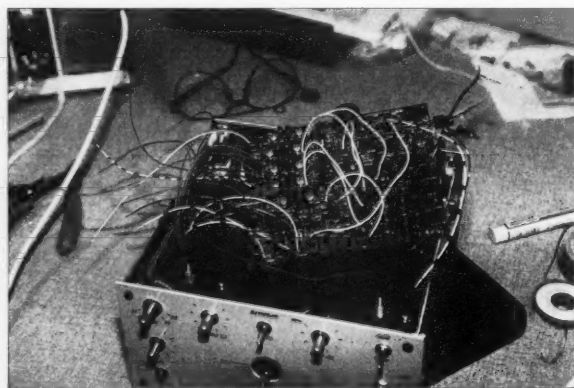


Photo E. Wiring in the T/R board on the bottom of the chassis.

point number 2 on the oscillator board. I have a Radio Shack frequency counter, and all I do is use alligator clip leads to connect the counter to the test point.

Then it's just a matter of adjusting a trimcap for each band to read a specific frequency. There are

Continued on page 51

Read All About It!

Part 3 of good stuff from The Hertzian Herald.

Here's all you ever needed — or certainly wanted — to know about “Computers — What’s going on in there?” Plus your added bonus this month: “2001: A brain odyssey.”

How do computers display dazzling video-game graphics, create 3-D views of a house from floor and elevation plans, or beat you at chess? What’s going on in there?

Actually, a computer is just a machine for switching sets of voltages between 0 V and +4 V states. (We call them binary 0 and 1 states.) Any intelligence a computer appears to have is due to its incredible speed, and to the cleverness of the programmers, who are able to assign human meanings to intricate patterns of these binary digits.

How fast is a typical 300 MHz computer? Imagine a store clerk who takes 60 years to calculate your change if you give him a \$20 bill for a \$12.39 purchase. That’s about how slow a human seems when compared to a computer. Such speed means, for example, that a computer can beat you at chess by checking all possible scenarios (most of which a human would consider grossly foolish) for ten moves ahead. This amounts to about ten billion

scenarios, but checking them all and choosing the one that leads to a victory takes only a few minutes for a computer.

How can strings of binary 0s and 1s have any meaning in human terms? Actually, there are three basic ways. (We call them data types.) The digits can represent memory address numbers, computer instruction codes, or user data. Let’s look at memory addresses first. (We’ll get to the others later.)

Early 8-bit microprocessors, used in the Apple II, Commodore Pet, and TRS-80 computers, had an address bus consisting of 16 lines, and a data bus consisting of 8 lines. Such processors are still quite common in automobiles, microwave ovens, and sewing machines, to name a few examples. Let us say that the 16 address lines from the processor go to 16 corresponding lines on an IC memory chip.

The lines are numbered A0 through A15. Line A0 represents a count of ONE if it is at +4 V, or ZERO if it is at 0 V. Line A1 represents a group of 2 counts at +4 V, or zero at 0 V. A2 is for a group of 4, and A3 is for a group of 8. Continuing this doubling for each higher line, then if A15 is +4 V it represents a group of 32,768. All possible

counts from 0 to 65,535 can be represented by various 1 and 0 states of these 16 binary lines. Just for fun, see if you can find out what number is represented by 0001 0100 1010 0000. (It’s a familiar number; answer appears later.)

What the processor spends most of its life doing is placing 16 binary digits on its address bus, which calls up one of the 65,536 locations in the memory. The memory then responds by placing 8 binary digits on its data bus, sending this stored data back to the processor.

Every now and then, the processor sends data TO memory, or it reads data from some input device, or it sends data to some output device. But mostly the processor sends a 16-bit address to memory and the memory responds by sending 8 bits of data to the processor; then the processor calls for the next byte of data at the next sequential memory address.

The computer is set up to treat the first byte of a program as an instruction or Op Code. The various 1 and 0 bits of the op code trigger various logic circuits in the computer. Here are some common operations that may be implemented:

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CIRCLE 16 ON READER SERVICE CARD

• Add two 8-bit numbers (or subtract them).

• Clear the bits in the accumulator (the computer's main storage register) to zero.

• Increment (add 1 to) or decrement (subtract 1 from) the accumulator.

• Shift the bits in the accumulator one place left, multiplying the number by 2.

• Shift the bits right, effectively dividing the number by 2.

• Complement the bits — 1s become 0s and 0s become 1s.

• Load the accumulator with 8 bits from a specified memory address.

• Store the 8 bits from the accumulator to a specified memory address.

In addition to telling the computer what operation to perform, the op-code bits tell the data type of the next byte (or several bytes). For instance, the op code may tell the computer to load its accumulator from address 10101010 11110000. The program byte following the op code would be 10101010 (high half of address) and the next byte would be 11110000 (low half of address). It would take three successive bytes in program memory to complete that instruction — the first having the data type OP CODE and the next two having data type address. The fourth byte would then be the op code for the next instruction.

The above instruction is in absolute addressing mode (Motorola calls it extended addressing) because it tells in absolute terms (without reference to anything else) what address the computer is going to operate on. There is an addressing mode called relative where the address bytes tell the computer how far ahead or back to jump relative to the address it is already at. There is another mode, sometimes called register indirect, in which the address is held in a separate 16-bit register in the computer, which has been preloaded by another instruction. The exact addressing mode of each instruction, and hence the data types of the following program bytes, are determined by the bits of the op code.

Sometimes the op code tells the computer that the next byte is not an address where the data is to be found

OBJECT CODE		SOURCE CODE	COMMENTS
ADDR	DTA	(\$ = Hex, # = Immediate Data)	
F800 F801	86 61	LDAA #\$61	Load Accum, immediate, with ASCII for "a"
F802 F803 F804	B7 40 00	STAA \$40 \$00	Send ASCII to printer at extended address \$4000
F805	4C	INCA	Next ASCII letter
F806 F807	81 7B	CMPA #\$7B	Finished letter "z"? (ASCII \$7A?)
F808 F809	26 F8	BNE back8	No (branch not equal) Send another letter
F80A F80B	27 FE	BEQ back2	Yes (branch if equal) Halt right here

Table 1. Sample program segment.

— the next byte IS the data. This is called immediate addressing, because the data follows immediately after the op code.

Sometimes no address needs to be given for the data to be operated on because the data is already in the computer's accumulator. Clear Accumulator or Increment Accumulator are examples. This is called inherent addressing, because the instruction is inherently complete in one byte. The following byte is the next instruction.

So, the bits on the data bus can represent op codes, addresses, or data.

You must understand that there is nothing about the bits themselves that distinguishes them as instructions, op codes, or data; it is their relative position in the program that determines how they will be interpreted. For example,

the Motorola 6800 microprocessor will interpret the same byte (say, 1001 0110) as instruction Load Accumulator if it appears first in the program, as Low Half of Address 0000 0000 1001 0110 if it appears as the second byte after the Load instruction, and as User Data if it appears at the specified address to load from, 0000 0000 1001 0110.

The computer itself makes no attempt to interpret user data; that is up to the programmer. For example, if the programmer sends data 1001 0110 to a printer that uses ASCII (American Standard Code for Information Interchange), the data will denote a capital letter V. If the programmer has been using that data byte to count parts loaded into a box, it will denote 150 parts. If the programmer is checking security on a building with 8 doors, data 1001 0110 will indicate that 4 of the doors are open (0s) and 4 are closed (1s).

Now, let's look at a typical program segment (Table 1) for a 6800 microprocessor. To avoid a confusing blizzard of 1s and 0s, the binary is converted to hex (hexadecimal): Each hex character represents four binary digits, as shown in Table 2.

The source code, on the right, is what the programmer writes. The object code, on the left, is what the computer executes. A "host" computer automatically translates the source code to object code. FE and F8 are "two's complement" for -8 and -2, respectively. Any digital book from the library will tell you about it.

Our program is 12 bytes long. Real-

world programs tend to be 10 kilobytes to 10 megabytes long, but they look exactly like our tiny one. This is just an example to give you a feel for computer programs, but if you have questions, write or E-mail me.

2001: A brain odyssey

Next year will be 2001. Are talking, thinking, plotting computers like HAL in the movie *2001* just over the horizon? I don't think so. If you have been following our discussion, you know that computers function by manipulating binary bits, and that meaning is assigned to those bits by programmers. The instructions are things like Load, Increment, Branch If Equal, and Add. Pentium-level computers work on 32 bits at a time rather than 8, and they have multiply and divide instructions, which some people find impressive — but there are no instructions like "seek and destroy enemy aliens."

Futurists often assert or imply that when the number of bits in a computer memory reaches the number of cells in a human brain, the computer will begin to think like a human brain. Comparing the computer to a brain seems reasonable at first because they both have the ability to store and process information. However, this is rather like comparing meteorites to bulldozers because they both make big holes in the ground. The question is not whether a computer is like a brain, but whether a brain is at all like a computer. Having designed them, we know everything about computers. We know almost nothing about the brain.

It was once thought that the brain was a binary device: a neuron either fired or remained inactive. It now appears that neurons fire in different ways at different times, and that the differences may reflect different informational content. Thus we are unable to say that the brain is like a computer even in the elementary classification as digital or analog. The other questions we ask when comparing computers are totally meaningless when applied to the brain: What's the word length? What's the clock cycle time? Is there a signed-number divide instruction? How many primary accumulators?

A striking feature of the brain compared to a computer is its ability to handle analog data in the presence of deafening background noise. For example, most of us could pick Mom's face out of the 30 faces in her eighth-grade graduation photo. A computer would be doing well to count the number of faces correctly, and probably couldn't tell which were boys and which were girls. The overwhelming superiority of the brain in this area, and the equally impressive superiority of the computers in mathematical and textual manipulations, suggests that these two devices may be operating in fundamentally different ways.

The big question is, What are computers capable of doing, and what can they not do? But computers just manipulate binary bits: 1 MHz or 400 MHz, 8 at a time or 32 at a time, that's all they can do. The question is thus better phrased, What can a computer program be written to do? This makes it clear that the answer to the first question depends on the programmers — humans — more than it depends on the computer hardware.

A computer does not have — and there is no reason to suppose that it will ever acquire — a will or a sense of purpose. A computer will execute a program to trigger a charge that will blow it to Hades with the same indifference that it will calculate the square root of six. Computers do only what we humans program them to do. Thus, it may be wisest to frame the question as, What do we want to have our computers do? This makes it clear that the answer to all three questions — and the responsibility — rests with us. 73

Hex	Binary	Hex	Binary
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

Table 2. Binary to hex conversion.

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CIRCLE 36 ON READER SERVICE CARD

Wattmeter Winner

73 reviews LDG's DWM-4 digital wattmeter kit.

This is a microprocessor-controlled unit that covers the HF (1.8 to 54 MHz, up to 150 watts), VHF (140 to 160, up to 150 watts) and UHF (420 to 470, up to 150 watts) bands. It uses a system approach to monitor both power output and SWR for up to four rigs in any combinations of bands. The system consists of a main unit with the microprocessor, and then a sensor unit that hangs off each rig you want to monitor.

I believe that LDG has once again come up with a winning kit. The design for this digital wattmeter was first published in a July 1999 *QST* article, and the new LDG kit is based on that design. My system has the main unit, one sensor for HF, and one for VHF.

The display unit has a 2-by-16 backlit LCD module. This display provides you with information about the RF that the remote sensors are sampling. Using the display and the Menu and Select push-buttons allows you to control which sensor monitors which band and whether you want the display to be a bar graph or numeric

output. You can look at the forward and reverse power and the SWR simultaneously.

The DWM-4 can operate with from 11 to 15 VDC at minimum of 75 mA. The correct power plug is provided with the kit. The manual states that any 50-ohm cable can be used to connect the remote sensor to your antenna system. SO-239 connectors are used in the back of the sensors for cable connections. You may need an adapter for the 2 meter module if you are using BNC connectors.

The kit is at the very top of my list with regard to quality of parts. The board is a work of art. It is very clearly

pads are very small, but allow easy soldering. This solder masking makes it very hard to end up with a solder bridge. The manual is also very well done. It is clear and easy to follow. There are step-by-step instructions, and you check off each step as you complete it. The manual has you install parts by how far they stand off the board. I really like this approach. It makes it much easier to get the parts flat against the board and have the project look nice when you have completed it.

I would rank this kit as easy to build. There are not all that many parts. The board is not very densely packed, and the silk-screen and directions are both clear. The parts come in separate packages. I found no need to separate out resistors and such before building. There are only a few values of each.

You will need to use an ohmmeter for the resistors. The resistors are 1/8 watt and that makes it very hard to check the color code at my age, even with my magnifying glasses on. It is also easier to take an extra minute to check rather than have to desolder parts later.

There is no external wiring. The jacks solder right onto the board. There are prebuilt ribbon connectors to

silk-screened and the parts holes are in the exact location so that when you place the part on the board, it fits perfectly. The board is plated-through and solder-masked. The solder masking is also at the very top of my list for being well thought out. The solder



Photo A. Front view.

connect the display and the controls. Even the switch and push-buttons plug into a board, and you just solder them to the board after they are installed in the case. This also makes the kit much easier to build, and saves a time at the end of the project. There is one toroid to wind for the HF sensor. The LCD board comes pre-assembled. I will repeat the fact that this is a very easy kit to build successfully.

The kit went together in about 2-3 hours as advertised. I have to admit I never clock building a kit. There were absolutely no surprises. The kit went together easily and was a pleasure to build.

The instructions have you build your sensors before powering on the main unit. I ended up taking a break between the main unit and the two sensors. I like to know that what I have built works correctly before going on to other steps. I connected 12 volts to the main unit and turned the power switch on. I expected some lights and such to start flashing or some other indication that there was life in the unit. No smoke, but no visible means of determining whether the project was up and running.

Next, I took drastic measures. I pulled out the manual and actually read it. Right there in plain sight, in straight English, it said I needed to adjust R25 on the main board to get the LCD level correct. About another 15 seconds later, the unit was doing everything it was supposed to at this point. The same thing happened with

the HF sensor. You would think I had learned my lesson. No indication it was working until I read the instructions and adjusted the unit's balancing capacitor. All in all, everything worked 100% as designed, first time up.

Calibration of the main unit involves using a known 100 watt output signal and a 1:1 dummy load. There are two variable resistors for each of the four possible sensor positions. You feed it 100 watts forward and adjust the digital output to read 100 watts. Next you reverse the mini-stereo jack leads and do the same thing for the reverse reading. The manual suggests borrowing a very exact meter and using it for reference. I plan on doing this very soon.

The functions of the meter are accessible by using the menu and select push-buttons. There are a total of seven menus. When powered up, the unit displays the model of the kit and the software version and then goes to the main menu.

Pushing the menu button cycles through the seven menu choices, and the select button is used to select individual menu options. This is intuitive and it should only take a couple of minutes to get things set up to your preferences. Pressing the select button cycles through the four channels and then to A.

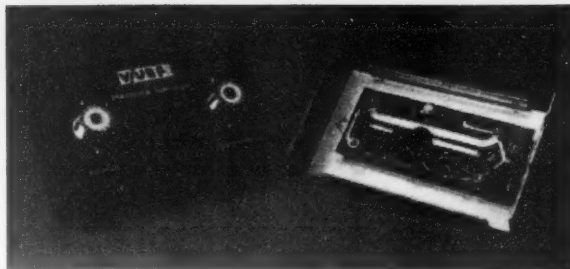


Photo C. Sensor kit.

the HF at either high or low power output levels.

The Alarm threshold allows you to select the SWR reading at which the yellow LED comes on. There is also a separate Relay threshold. This controls an internal relay that can take the power out of line if the SWR goes past a set point. You can also set whether you want the relay to automatically reset or manually reset.

There is also built-in error checking. One type of error reading will come up if the forward maximum power level is exceeded. A second error is displayed if the reverse maximum

Continued on page 53

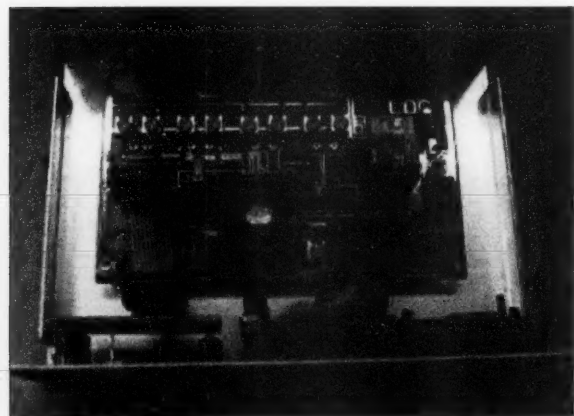


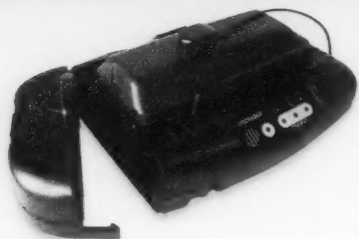
Photo B. Inside view.

The A is for automatic operation. In this mode, the display automatically switches to the channel that is currently sensing forward power. If two channels both have forward power, the smallest channel number gets priority. You can have either bar or numeric readout. You also can set

Specifications	
Board size	3.5 x 4.0 inches
Enclosure	6.0 x 4.0 x 2.0 inches
Sensor size	4.0 x 2.0 x 1.5 inches
Sensor connections	SO-239
HF power ranges	15, 150 watts
VHF/UHF power range	150 watts
Power requirement	11 to 14 volts DC, 75 mA
Measures peak or average	
Bar or numeric readout	
LED and relay variable alarm system, 1:1 to 30:1	
Built-in error-checking software upgradable	
Kit builds in 2 to 3 hours average	

Table 1. Specifications.

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Revenge of the Hams

As our restructured hamdom now sets out to do continued battle for survival and growth in the e-business of the New Economy, it's sometimes easy to forget that the Intels, Ciscos, and Microsofts of the digital world have not been the only sources of technological innovation and application during the past few decades.

Much to our benefit, a number of ham manufacturers have not been slow in embracing the new technologies in ways that are as striking as they are revolutionary, and it is these types of advances that will help us most in attracting new members to the ham ranks. So our 73 hat is off not just to the Alinco-Hamtronics-Icom-Kachina-Kenwood-MFJ-Yaesu techie pioneers, but also to the many small and medium-size ham manufacturers who are also keeping up with the computer Joneses and then some.

On this month's cover, supplied by Kenwood, we see a good example of just how far things have come — and how ham technology continues to progress.

Although the TS-520S dates back to 1975, you will still hear many of them on the air today — a sure tribute to a versatile design. Designed when digital displays were not available on HF rigs, this is a rock-solid rig whose optional VFO for split operation makes it a favorite of contestors.

Still, Great Grandfather 520 pales in comparison to Great Grandson 570, Kenwood's new TS-570D(G) transceiver. This state-of-the-art rig features 16-bit AF-stage DSP, the NR1 noise reduction system, TX audio shaping, CW autotune, large LCD display, 46 types of menu features, heavy-duty transmitter section, a bank of 100 memories, PC control option, and — of course — much, much more. Ready to transmit on the 160–10 meter amateur bands and receive at 500 kHz to 30 MHz, the TS-570D(G) measures a scant 10-5/8"W x 3-3/4"H x 10-11/16"D, making it ideal for shack, car, RV, or boat.

Why not visit your favorite ham manufacturer or dealer today — in person or otherwise — and part with some of your hard-earned New Economy cash? Keep

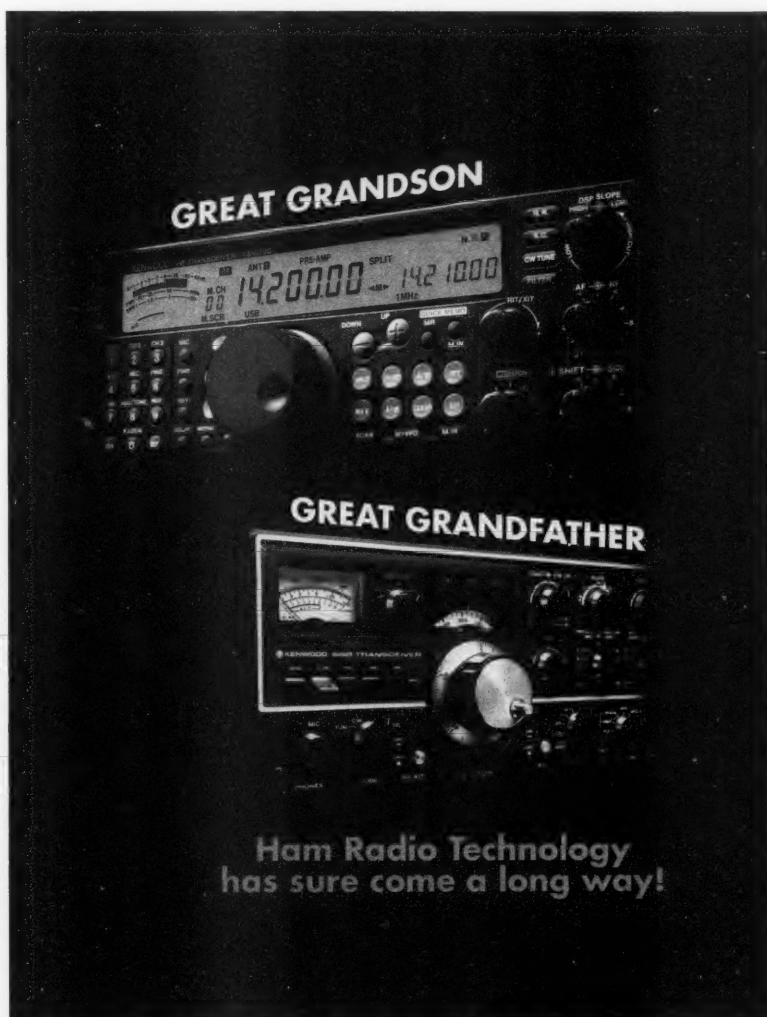


Photo A. Kenwood's Great Grandfather and Great Grandson.

active or get active again with a new rig, logical whizbangs to the kids down the block.

NEVER SAY DIE

continued from page 4

Clubs

How lively is your ham club? How much fun are the meetings?

Running a ham club is an exercise in show biz. Heck, that holds for *any* club. If you make the meetings fun, they'll come.

My first experience with this was when I was elected president of my college ham club (W2SZ). At the time we had about eight members coming to meetings. A year later I had over 400 active members! Show biz.

When I bought my first Porsche, I went to the Porsche Club of America meetings and snored through the technical discussions. I suggested we get some action going and was quickly elected president. I kept 'em busy with club rallies and gymkhanas, and organized yearly factory visits to Stuttgart, where we picked up new Porsches and got to drive them under the supervision of the Porsche factory racing team on the famed Solitude race track. The membership soared, and we all had a ball.

Then I moved to a sleepy little New Hampshire town, where I joined the Chamber of Commerce. Big deal, we had about ten active members. With some show biz, as president I pepped up the meetings. I had the governor, the president of a local college, and some political candidates come to talk. I had representatives of the local banks at a

roundtable fighting with each other for our business. The membership went to nearly two hundred in a year.

If you want your ham club to be fun and grow, you've got to have exciting meetings, and that means interesting speakers. It also means keeping almost all of the club business within the executive committee, with a very brief committee report at the regular meetings. It means getting meetings going on time and starting 'em with your speaker.

I've addressed hundreds of ham clubs over the years, and far too many bore the hell out of their members with club business discussions, the election of officers, and so on, having them yawning and fidgety by the time the speaker is introduced.

Okay, where do you get interesting speakers? Take a look at the ads in the ham rags. Are there any ham manufacturers or dealers within driving distance? How about hams who are into some special ham activity — such as fox hunting, DXing, ham satellites, packet, RTTY, slow scan, and so on? Maybe even some show and tell on QRP?

If your club is in the boonies, then how about getting the ham manufacturers to do a video talk for you? I've done that for some clubs and even have given keynote talks for computer conferences where they didn't want to pay my travel costs. Wouldn't your club members be interested in seeing a video by the top gun at Icom, Yaesu, Kenwood, Ten-Tec, Kachina, and so on showing and talking about their latest creation? You bet they would! I know I'd drive an hour to a ham club meeting if something like that was on the menu.

And with today's digital video cameras and computer editing systems, it's easy for manufacturers to put together a very professional video presentation. I'm using the iMacDV and a Sony 310. Fab!

For that matter, how about doing some club videos you can swap with other clubs? Many years ago the Philadelphia Philmont Mobile Club used to do movies of their fox hunts. I still remember some of their epics. So get busy and do some videos of your club Field Day effort. Or how about a VHF contest special, where the club sets up on a mountain and has a ball? Get your little gray cells into action and get busy. The more club activities you can get going, the more members you'll attract.

Whither Ham Radio

It's about time to come to grips with the reality of amateur radio today, something I haven't seen recognized by the ARRL or, for that matter, in any of the ham club newsletters. Or *CQ*, etc.

When I got involved with amateur radio, back in the mid-1930s, the hobby was in flux. The battle over spark (Spark Forever!) had just ended, with spark being made illegal. The first commercially made receivers from National Radio and Hallicrafters had instantly stopped hams from building their own receivers, but we still had to build our transmitters. Most of our transmitters were ultra-simple: a crystal oscillator and an amplifier tube. Around 95% of all ham communications were via CW, with a handful of Class A ops in the 100 kHz phone segments on 75 and 20m. Class B phone ops were almost totally on 160m, as 10m was an as yet unexplored VHF band.

Then came WWII and four years of QRT, followed by tons of US Army war surplus. (And almost no Navy surplus, since the Navy routinely destroyed their used and unneeded new equipment. When a bunch of new construction contracts for submarines were canceled right after the war I watched millions of dollars of fabulous radio, radar, sonar, and fine test equipment which had been set aside for the boats being crushed at New London.) Most of the surplus was easily converted for ham use. This was soon followed by commercially made ham transmitters, effectively stopping 95% of us from having to build anything. The day of the "Appliance Operator" had arrived. And, for all practical purposes, the need for even the slightest understanding of electricity or electronics. Most of us bought a transceiver, an antenna, and talked.

I got involved more for the fun of building equipment than operating. I built hi-fi amplifiers, an all-band kilowatt rig, a complete RTTY system, and so on. I spent years at my workbench building and converting surplus. I was the first ham in New York City on 6m, I DXed on 2m from the top of The Daily News building, and so on. When SSB came along, I quickly built an SSB rig.

Then, in 1965, when I saw that transistors had essentially ended the era of ham building, I held an auction and got rid of several truckloads of parts, tubes, and surplus equipment. And that was the end of my building.

Today there are so few hams building equipment of any kind that getting articles for 73 on simple projects is nearing the impossible. Sure, hams like to read about construction, but that's ham fiction for most of us.

The reality of hamming today is that, as I said, we buy everything, plug it in, and talk.

From that point of view, the ARRL's recent defense of the Morse Code just shows how totally out of touch with reality the guys you've elected as directors were.

The 21st Century

Okay, I've been talking about ham radio circa the 1990s. But now we've got to face the reality of the Internet, something we've been avoiding. Now we have rigs such as the Kachina, which can easily be adapted to be

 <p>"SPIKE" ANTENNA Standard thru-panel type Motorola mount. Has solder lug for coax cable. Rod is approx. 8cm long. A new rod of different length may easily be fashioned for frequency of choice.</p> <p>97A005 \$5.95</p>	 <p>NEC AMPLIFIED SPEAKERS Amplify output of ham radio or VCR, or as multimedia speakers. Approx. 30 Watts give excellent sound quality. Lines out for recording and earphone jacks. Schematics to build your own power supply (±15 VDC @ 1 A). Size approx. 11"H x 5"W x 5"D.</p> <p>98V013 \$9.95/pr.</p>	 <p>ECOHEAT™ HEAT GUN An economical, lightweight, multi-use heat gun with two heat settings (500° and 1000°F). Has 3-position slide switch, built-in hand guard, 3-wire grounded cord, thermo-plastic case. UL listed, 120VAC.</p> <p>EC-100 \$32.95</p>
 <p>COMPOSITE AUDIO/VIDEO RF MODULATOR Wire in, "F" connector out. In = B+ 12V7. Sorry, we don't know if it's channel 2, 3 or 4. SMK #CN394.</p> <p>99V013 \$4.95</p>	 <p>LASER DIODE Toshiba TOLD9200. 670nm, 9mm dia. case, 3mW, 2V @ 80mA.</p> <p>99S004 \$14.95</p>	 <p>RG142 COAX CABLE 92W018 \$2.50/ft</p>
<p>PLASTIC SPEEDY BOXES ABS black plastic with slotted walls to accept PCBs. Screws included. Will not crack or split when drilled or punched.</p> <p>PB114A - 1" x 3" x 2" \$2.20 PB114B - 0.8" x 4.25" x 2.188" \$2.50 PB114C - 1.563" x 3.875" x 2.938" \$3.00 PB114D - 2.313" x 5.875" x 3.938" \$5.00</p>	 <p>PELTIER JUNCTION 1 1/16" sq. x 1/16" copper plate soldered to opposite side of module that is soldered to 2" x 3" x 1/2" heatsink. Nominal Voltage: 12V @ 0.72A. Cool Pentium CPUs or devise your own applications. Units may be paralleled for increased capacity. Reversible voltage either heats or cools.</p> <p>98U001 \$19.95</p>	

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operated from anywhere in the world via the Internet, complete with tuning the receiver and turning a beam remotely. What are the ramifications of this turn of technological events? Repeaters are being integrated with the Web, which raises a question. What can we do to keep any unlicensed Web surfer from accessing a repeater and making ham contacts? Or do we need to? What are the downsides and upsides?

How long is it going to be before we start seeing Web interfacing units advertised in our ham rags?

Keith Lamonica W7DXX recently set up his Kachina rig with Internet access. The first contact was made by a Hong Kong ham! Keith is busy putting up a tower and beam, adding a pair of shoes, and getting the bugs out of the software.

True-blue hams blanch at the horror of nonlicensees accessing our repeaters or getting on the air via a Web-controlled HF rig. Hmm, so what, today, is the difference between an ordinary web surfer and a ham? It's that the VECs are administering.

I've got a semisecret for you. When I got my ham ticket over 60 years ago, I memorized the *ARRL Q&A Manual* and I didn't know diddly about electronics. Oh, I could build a ham rig from an article in *Radio*, but if anything didn't work I was on my way to see Cy W2IXY, just as about every other ham in Brooklyn (NY) did when their rigs didn't work. It wasn't until the Navy put me through a nine-month course in electronics that I really understood what was going on.

With today's equipment, when something goes wrong, we just send it to the importer for repairs. I no longer have the test equipment it takes to service one of today's ham rigs. And never mind trying to get into an HT! Lordy!

And 99% of you are in the same leaky boat. You buy, you operate, and that's it. Okay, then, just what value is there in our passing the VEC tests? They're memorization, pure and simple.

It's no wonder that in 1963, when the ARRL petitioned the FCC to make almost every ham go to the FCC offices to pass their tests again, that tens of thousands panicked and sold their ham gear for pennies on the dollar, putting every major manufacturer and almost 90% of the ham dealers out of business, all within a year or two.

Today, in 2000, the situation hasn't improved. The 1963 ham disaster closed down over 90% of the school ham clubs, shutting youngsters out of the hobby. And that, in turn, stifled ham innovation and pioneering — which has always been mainly done by youngsters.

Jack Babkes W2GDG was 25 when he developed narrowband FM. I lived just a few blocks from him, so I quickly (age 23) started pioneering this new mode. The developer of SSB was a youngster, ditto Cophorne McDonald and his slow scan.

Our serious lack of young hams since the ARRL purge, I suspect, explains why amateur radio has contributed so little to the advancement of the art (one of the major reasons for the FCC authorizing the hobby) in recent years.

Today, the average age of our General-Advanced-Extra hams is in the 60s. And in the

minority, with 57% of licensees being Novices or Techs. These so-called entry-level license classes now dominate the hobby.

I'd like your take on where amateur radio will be going during the next few years. Obviously we're going to have to in many ways integrate with the Internet. So, let's be realistic about this so we can plan, rather than let nature take its course. Get busy with your word processor and pepper me with disks and hard copy of your proposals for our future.

In the meanwhile I'll be looking for articles on Internet interfacing, and reviews of new ham gear. We all want to know what you think of your new rig (or whatever).

Y2K Fallout

Was the Y2K bug a \$600 billion fiasco? Nope, even though we didn't feel a wrinkle, the problem resulted in tens of thousands (millions?) of computer systems being upgraded and updated worldwide. It held a lot of hands in the fire, forcing badly needed upgrades to no longer be put off.

Well, you've read about what terrible shape many of the government computer systems were in. Many were relics of the '50s and '60s, with more patches than an Okie tire. With the Y2K bug about to trash these obsolete systems, and with no practical way to add still more patches, many bureaus gave up and started fresh. It was a long overdue expense, but now it's paying off in better information systems for thousands of companies.

Those Pileups

The ARRL's long-term goal of keeping QRM down on our DX bands via their Morse Code barrier must have the directors jumping gleefully these days. Never has the DX been rolling in better. Never have there been so few American hams chasing DX. I can remember DX pileups on 20m with hundreds of stations all fighting to get through. Heck, I've been on the other end of some of those in my operating from Jordan, Navassa, Nepal, and a few dozen other weird places. But, if you listen today, you can hear one- and two-station pileups, even on some of the rarest DX. You don't need a kilowatt and a big beam to break through these days — all it takes is 50 watts and a dipole.

Now, thanks to the FCC finally thumbing its nose at the League, we'll be seeing some growth in HF operating. The DX is out there by the ton — go get it!

URL News

My thanks to Randy Frum for pointing out an oversight in my column last month. On page 62, under Micro Web Server, the correct URL should have been [www-ccs.cs.umass.edu/~shri/iPic.html]. Note the hyphen after www.

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You're So Vain

You probably think this article is about you.

Alright! So you've finally got your new vanity callsign, and you've shown it off on the air. Now, how about showing it off to the rest of the world!? One way you can do this is with a vanity license plate for your car or vehicle. With apologies to Carly Simon for the title, here's how you can be so vain ...

Vanity plates have been around for quite some time. I've had mine for years now. You have probably seen these types of plates on the road. They are usually a maximum of 6-8 characters and/or numbers, and spell out something on the plate. The word(s) usually have some special meaning to the owner of the plate. Some are simple words like someone's first name or perhaps a word like BI-

NARY, which would have special meaning to a computer programmer. Others like 2M8OS ("tomatoes") have to be more creative because of the limited number of characters. (Imagine someone trying to figure out what your callsign means in English!)

Ham callsigns on a vanity plate make sense because they have the right number of characters and since they mean something not only to the ham

who owns it, but to other hams as well. More properly, though, ham calls belong on a specialty plate (described below).

It would be nice if I could just show you a uniform method for obtaining your own plate. Unfortunately, each state has its own setup for issuing plates, and they vary enough that with the limited space of this ar-

ticle I couldn't cover all the details of every state. Besides, Web sites like [<http://bookworm.sdsu.edu/plates.html>] already give you some of the basic information by state. If you want a plate, you're going to have to do a little investigating on your own, but this article will point out a couple of things to look out for.

First, you've got to determine if your state allows custom plates or not. A good place to start is on the Internet. Try [<http://www.state.xx.us/>] as a starting point. Just substitute your 2-letter state abbreviation in for the "xx." For example, Pennsylvania's state page is at [<http://www.state.pa.us/>]. You could also just try looking up your state's Department of Transportation (or Department of Motor Vehicles) telephone number in the phone book.

Once you determine that vanity plates are indeed available to you, you need to look at the options. In some cases, there are actually a couple of different types of plates to choose from, and there are many terms for these plates. Some of the various names are: vanity plates, special plates, specialty plates, personalized plates, special fund license plates, and so on.



Photo A. Here you see my plate (AC3L) and my wife's plate (OK4U). At first glance, you might think that she is an amateur too, but if you look a little more closely, you'll see that hers has a different meaning. My wife was always telling me, "Okay for you, Ed," and I think that, for a while, it was her favorite saying. So much so that I suggested she get the plate.

Be sure to check the definition and requirements for each type of plate available to you. For example, your state may define a vanity plate as having 1-3 numbers only, or perhaps 3-7 letters only. In that case, you would not be allowed to have a ham call on it. On the other hand, many states' personalized license plates allow both letters and numbers.

Note that you may still not be allowed to put a ham call on a personalized license plate if your state provides for a specialty-type plate for amateur radio.

Specialty plates have a special graphic or otherwise a special "look" to them to set them apart from the normal state license plate. Special plates exist for everything from zoos to drug abuse resistance education (D.A.R.E.) to wildlife preservation.

Many states have provided a special type of plate reserved just for amateur radio operators. This specialty class of plate is often referred to as the "call letter," "ham radio," or "amateur radio" plate.

Next, you need to be aware of any requirements you may have to meet before applying for a specialty plate. You may have to keep emergency amateur radio equipment in the car, or you may just have to show proof of a valid FCC license. On the other hand, you may just have to provide a fee to obtain your plate. As for applying for your plate, some states do allow you to apply on-line, but others, due to various paperwork needs, require you to mail in your application.

As with most things in life, there are both advantages and disadvantages to having an amateur plate. On the downside, there is the possibility that it just might help some thief know where they can find radios to steal. On the plus side, there are the small things like how it helps other hams you've talked to (but have never met) recognize you at hamfests. And there are the important things like emergency situations in which it can help others, who may be in need of emergency radio communications, to find the help they need, or may gain you access to an emergency scene where you are needed.

A closing note: While researching vanity plates, I came across an interesting advantage that I hadn't thought of. License plate collecting makes an interesting hobby for some. And perhaps it could

even be a profitable one. I found one page with a personalized plate that had an asking price of \$25,000 (see Table 1). Who knows? Someday, maybe your plate will be worth that much, too! 73

URL (http://)	Destination
cache.cow.net/~friedman/dmv.html	Departments of Motor Vehicles links
www.sos.state.il.us/depts/vehicles/pers.html	Illinois state personalized plates page
www.oktax.state.ok.us/oktax/licperm.html	Oklahoma amateur radio plate information
www.arrl.org/field/regulations/local/plates.html	ARRL amateur license plate fees page
www.co.honolulu.hi.us/ocda/hampl.htm	Oahu Civil Defense Agency amateur radio license plates page
members.tripod.com/scottk1/phgLinks.html	License plate links
www.domainmart.com/book/4saler.htm	A \$25,000 plate?
listings.ebay.com/aw/listings/newtoday/category421/index.html	License plates being auctioned
www.chaos.umd.edu/misc/origplates.html	Vanity plates and what they mean

Table 1. Here are just a few of the interesting sites I found regarding specialized license plates.



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Another Look at the NW-40

EMTECH's QRP transceiver kit proves a winner.

Author's note: EMTECH kits were designed by Roy W6EMT. He passed away shortly after I built this kit two summers ago. His energy and enthusiasm will be missed. The EMTECH product line is now owned by his son Scott KC7MAS, who is carrying on the fine tradition.

I had a longing to return to low power CW and to build something. I searched the magazine ads and the Internet looking for a QRP transceiver kit that covered the complete 40 meter CW segment and had enough audio to drive a speaker. I didn't want to cover just a small segment of the band and I wanted the transceiver to have a large dial so that I could easily read the frequency. In addition, I had plans to use the transceiver during Field Day on natural power, so low receive current consumption was also on my spec list. I reviewed the data on all the available rigs, and placed an order for an EMTECH NW-40.

The EMTECH kit arrived and I spread it out on the kitchen table — which is always the first inspection process for any product that I order. My wife eyed the unpacking process. I distributed numerous small plastic bags of parts all over the table. She finally spoke: "All right, I give up, what are you doing?"

"I'm looking at this kit."

"What kind of kit is it, is it a Heathkit?"

I love my wife. She has the memory of an elephant, and she remembers the many Heathkits that were assembled on kitchen tables in the past, mostly in apartments and military housing.

parts identification explaining what those little mystery numbers mean on the capacitors and other goodies. The final assembly page had a nice pictorial with a drawing of the various controls, jacks, and final assembly wiring, which was point to point. This page really looked good — just follow the picture and hook up the wires. Hidden in the back of the manual were two pages of resistance and voltage charts for troubleshooting if needed.

The most unique thing about the manual and the kit is the organization. The manual is divided into logical, organized sections that make sense. When you finish building a stage, you actually power up the stage you just built and test it before continuing on with the construction of the remaining stages. Believe me, this is the way to go. This is a much easier process for construction than building the whole thing and doing the famous "smoke test." Now I knew the reason for all the large number of plastic bags of parts. These were the "stage" bags — you build the kit bag by bag or stage by stage. Anyway, the manual looks good and the kit has passed the kitchen table inspection stage with flying colors.

"No dear, Heathkit is out of the kit business, but this kit by EMTECH reminds me of Heathkit."

I grabbed the manual; if the manual looks good then the kit stays. It had the usual schematic and board layout, including both sides of the board. Ah, a nice page devoted to

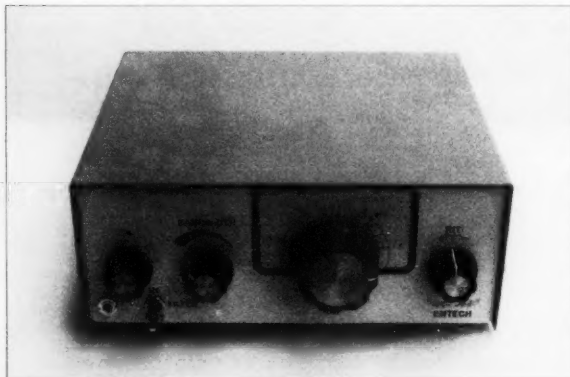


Photo A. Outside view of EMTECH NW-40.

Continuing with my screening of the kit, I picked up the circuit board. What got my immediate attention was the wide circuit traces. Wide traces are important if you make a mistake with a parts location and have to unsolder the part. In some instances, when you make a mistake and try to unsolder the part, the heat can cause a small printed circuit trace to lift right off of the board.

If you do make a mistake during assembly and have to remove a part, then use desoldering braid to suck the solder out of the parts hole. The braid is sold at Radio Shack and has a part number of 64-2090.

I commented on the wide traces to Roy W6EMT and he answered that he did "PCB design for years, and his boss liked wide traces." All I can say is that if you have a choice, then wider is better for beginning kit construction. The board has an easy-to-read silk-screened outline of all the parts to help you with the placement, so just use the manual and plug in the parts — it's easy.

After the initial inspection and familiarization, I continued with the construction. No one likes to wind coils, so the instruction manual starts you off by having you wind all the coils needed for assembly so that you can have them ready when you need them. Most of the coils are on small, donut-shaped high Q toroids, so the coil winding process is not too tedious. The final amplifier circuit coil, L-5, requires two windings. This is kind of confusing, but EMTECH has supplied color-coded wires to help you keep track of them.

As per the manual, I started on the VFO (variable frequency oscillator) section first. This is a pretty large step for starting a kit, keeping in mind that you are going to check out each stage as you build it. I guess EMTECH figured that if you are going to have a problem, it most likely will be in the VFO. Grabbing the bag marked VFO, I did an inventory of the parts. This is very important, because it helps you identify and locate the parts for each step and will speed up the actual assembly process.

During the identification of the parts of the kit, you have to refer to a "Bands Table." The manual covers kits for four amateur bands; some of the parts are different for each band.

I started stuffing the board with the VFO parts, and I noticed that the holes drilled through the board were very precise. The parts were easy to fit in the holes, and there was no forcing of parts through the board. The VFO went together in about an hour, and I was ready for testing. You will need either an allband receiver or a frequency counter for testing and calibration, as the VFO on the forty meter version operates on a frequency of 4.800 MHz to 5.000 MHz. The IF frequency of the transceiver is 12 MHz, so that when you receive a 40 meter frequency of 7.000 MHz, it mixes with the VFO frequency of 5.000 MHz and produces the IF frequency of 12 MHz.

As you tune the transceiver dial higher in frequency, the VFO actually goes lower in frequency. As per the instructions, I adjusted the turns on L1 by spreading and squeezing them to get the VFO to fall within the specified range. I played with the large air variable and was impressed with its built-in ratio tuning; you have to turn the shaft of the air variable several times to cover the complete range, providing very good coverage. The tuning capacitor is a hefty, solid unit and mounts on the

board to provide a rugged, stable assembly. Conducting a preliminary test, I banged the assembled VFO board around on the bench while listening to the signal on 4.950 MHz. The output signal was very steady and shifted very little.

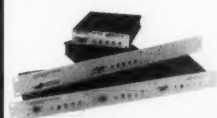
Encouraged by the VFO, I went on to build the keying and antenna switching circuit. The keying system is all solid state and there are no relays. The antenna switching circuit is switched by diodes. A look at the schematic showed it to be really well engineered, with no exotic pin diodes. As I was building the keying circuit and other stages, I noticed that I kept putting in bypass capacitors everywhere — great, you can't have enough for a stable system. When it came time to check out these circuits, I had a problem. I had forgotten to put in jumper J4. In the instruction book, the keyer parts list has two columns, so be sure to read the second column, which in this case only had one item: jumper J4. Overall, the checkout was very easy and only required a VOM. I looked at the keying on the scope, and it produced a nice square wave pattern.

Next were the RIT circuit and the audio amplifier. Testing the RIT on the bench resulted in a very stable circuit. Testing the audio circuit was easy. You can use some kind of audio generator, or try a secondary method contained in

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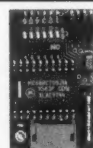
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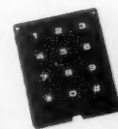
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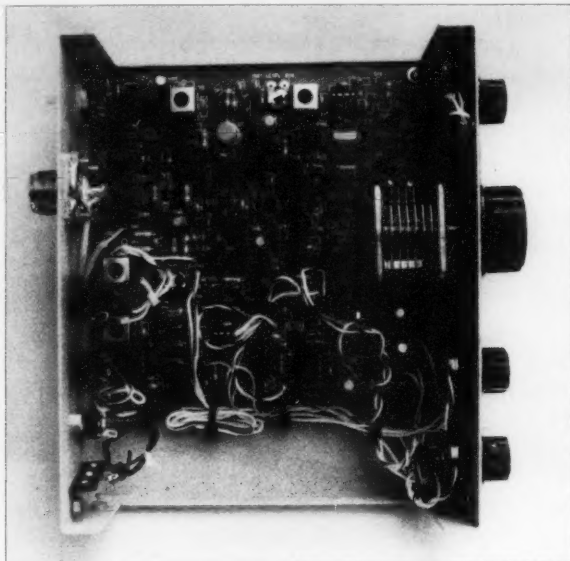


Photo B. Inside view showing PC board assembly.

the manual. This is just to "touch the pot connections with your finger, you should hear a hum." Ah, reminds me of troubleshooting the old five-tube radios many years ago.

After I finished the RIT and audio circuits, I noticed the empty bags collecting on the bench, charting my progress. Obviously, as you finish a stage you should not have any parts left over in a bag. If you put in a wrong value early in the assembly, you will catch it when you are finishing up the bag of parts for the current stage you are building. When constructing the different stages, if you can't find a

part, remember to check the bag designated for your band. It is a separate bag of parts for 40 meters, so it will be marked 40M. Overall, quite failsafe construction.

I was ready when it came time to build the more complicated receiver. I was now familiar with the board and how to use the instruction manual. Your training in constructing the previous stages will

now pay off, as the receiver is going to have more parts and take up a good portion of the board.

When building the receiver and the transmitter, you'll find there is a large parts count. I recommend that you again identify each part and mount the parts on a piece of cardboard in the order of assembly. This will organize your building and again will help you with the parts identification.

As I constructed the receiver, I noticed that another voltage regulator was being added to the board. This was the third regulator — impressive, because voltage regulation equals stable performance.

I had no problems with the construction of the receiver, and following the instructions, I adjusted T-3 for maximum noise by ear (it doesn't take a rocket scientist to tune for maximum noise). Then I added a two-foot wire antenna jumper to TP6 (test point 6), and what surprised me was that I immediately heard signals. This was

without any real antenna connected — I was only using the short jumper! Very impressive.

During your testing, don't forget to hook up all the controls; remember that the variable bandwidth control must be connected for the tests. It must be fully CCW and not clockwise for maximum signals, and please don't ask me what I did. I wanted to continue with the kit, but had to stop and play with the receiver. With an external antenna of 40 feet of wire hooked up to TP6, I commenced to cruise 40 meters. Checking out the RIT, the bandwidth control, I even went up to the lower phone portion and listened to lower single sideband phone, very clear and easy to tune in. The overall tuning was very smooth and positive. It was easy to tune in signals and they stayed put. The NW-40 is a very stable receiver.

Building the transmitter was very uneventful and the tuneup was easily accomplished. The transmitter uses a large type TO-220 transistor that is heat-sinked to the chassis. A very rugged system, and if the final should need replacing, it would be an easy process.

I have tested this unit at two Field Days, and have earned the local radio club's credit for "natural power."

QRP operations were conducted in a typical Field Day environment, with three transmitters in the area. I had no problem with the transceiver using a 40 meter doublet located 300 to 500 feet away from the other transmitter antennas. The EMTECH suffered no major front end overload problems and was easy to use. Its break-in circuits, RIT, and audio filters make it a top-notch unit. It only draws 50 mA on receive, and was perfect for solar power and "hand crank power."

Overall, this is a very stable, easy-to-build transceiver, almost immune to vibration and temperature changes. The large, rugged, tuning capacitor in the VFO is the kit's secret, and you won't find this feature in other QRP kits. The receiver is very sensitive, detecting signals on 40 meters of 0.1µV,

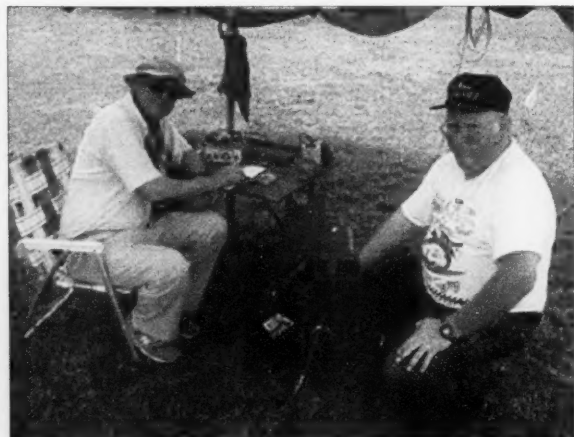


Photo C. Breck K4CHE and Russ AA3HX operate the NW-40 at Field Day.

Continued on page 51

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Accessories for Our HTs

Most all of us have become attached to the ubiquitous handie-talkie, or HT as we call it. It has become a very useful tool not only for communication purposes but also as a social tool enabling us to exchange ideas or just chew the rag with old friends — not to mention meet new ones on the air.

These HTs we depend on take quite a beating in our briefcases, backpacks, and gloveboxes. They also get bumped into while attached to our belt. I know that I have been guilty of dropping my backpack down to the floor, only to hear a good clunk emanate from the HT as it hit. Or when wearing the HT on my belt, I've bumped it on the side of a closing elevator door. It is amazing that these very useful tools take quite a beating and still survive the physical rigors we subject them to. It's a great credit to the manufacturers' design teams for putting such a rugged piece of electronics into such a small package to protect it so well from abuse.

I remember looking at a two-channel crystal-controlled 2 meter HT at Western Radio here in San Diego quite a few years ago, and trying to decide if I wanted it or an Icom IC-202 SSB-only portable 2 meter (much larger than HT size) radio. This was at a time when military surplus ARC-5s were being converted to HF operations, and military surplus in electronics was king for those on a limited budget.

For those not familiar with the IC-202, it's about Webster's Dictionary size, with the front panel on the front or book binding side. It contains room inside for 9 "C"-size batteries. About twice the size of that first two-channel HT I saw. Needless to say, it took quite a few years to get from the simple 2 meter FM rigs in taxi cabs to our sophisticated HTs of today. I remember being put on a waiting list to obtain the really first synthesized 2 meter HT that I can remember, the Icom IC-02. What a powerful piece of electronic engineering when it was introduced.

The IC-02 incorporated so many features that we take for granted today — like programmable repeater shift, access tone frequencies,

touchtone for dialing, and total frequency agility about the 2 meter band. There was so much competition to get one of these HTs that I got put on two waiting lists. Finally I was able to obtain one for myself. Two days later, the second dealer called stating that my turn to purchase another unit was here, and I accepted. I remember well that my partner Dave Gebler at Pac Bell in program services, also an amateur, had expressed interest in the HT but did not get on a list. I (deceptively) borrowed some money from him and purchased the HT, and presented to him the option of taking the HT or being reimbursed at pay-day. He snapped up the HT so fast I never saw the box move. We enjoyed many years of operation with these two HTs, and kept in contact over the years with them.

Today, with even more sophisticated radios taking on the operation of a computer and contained in an HT body, the level of complexity astounds us to the point of having to carry a "cheat sheet" to remember how to access all the options the radios are capable of performing. Yes, I still have my old original IC-02 2 meter radio and have added its brothers the IC-03 for 220 and the

IC-04 for 450, along with a dual-band IC-32A.

Getting into even more modern toys, I could not refuse the temptation of a Yaesu VX-1 and its VOX operation headset mike for gatherings and swap meet communications. It's great for low power communications, and has very wide band reception, covering AM broadcast through just about every communications mode up to 1 GHz. And it still transmits on 2 and 3/4 meters to boot. This radio is so small that if it did not have an antenna, you would lose it in your shirt pocket. It operates on

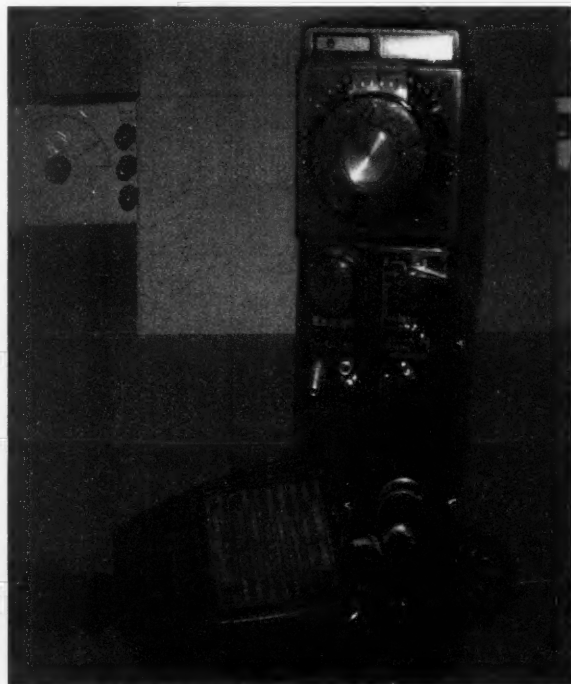


Photo A. Older Icom IC-202 SSB portable uses 9 internal "C"-size cells for portable operation.

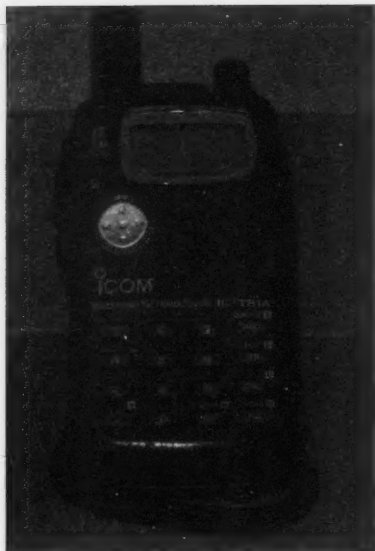


Photo B. New Icom IC-T81A four-band HT covers 6, 2, 3/4, and 23cm amateur bands. Five watt output on all bands, except for 1 watt on 1296 MHz (23cm).

a multi-cell Ni-MH that is smaller than a single AA cell.

Now just being offered from Icom is the world's first 4-band HT. Yes, I said "FOUR-BAND HT!" The IC-T81A is fully capable of covering 6 meters—50 MHz, 2 meters—150 MHz, 3/4 meter—450 MHz, and 23 centimeters—1240 to 1300 MHz! Wow! What a capable device! The IC-T81A is full-featured FM operation on all bands, with 5 watts on all bands below 450 MHz and 1 watt on 1296 MHz. Fully programmable splits, tones, and much, much more. Included with the standard HT is a Ni-MH 9.6 volt 680 mAh battery. I must be HT-crazy, as I still have

my old IC-02 (2 of them) and even a maritime model called the M-5. In my case, all of these HTs still function well today, saying a lot about the quality of construction both internally and externally.

Well what then are the bad points experienced today from all this venture into my worlds of HTs? Surprisingly enough, the older HTs fare better over longer periods of operation. Over the years, I have had them still keep on ticking. I have had to replace two internal lithium cells in the IC-02s, and the original NiCd cells in the same HTs. Remember, these radios are quite old and don't owe me anything, as they have functioned well and still do with these minor battery repairs. Comparing them to the more modern and much smaller multiband versatile HTs like the VX-1 and the IC-T81A, their operation is very good from a battery consumption use rate, but not as good as the earlier synthesized HTs.

The problem, as I brain it out, is that the computer-driven processes and higher power output on transmit (like my IC-T81A @ 5 watts which draws 1-1/2 amps on transmit) can take their toll when compared to a 2-watt-or-less HT. (Remember, the older HTs had large, high-capacity battery packs and double the size of these newer HTs.) If you plan to go to a daylong gathering where you intend to use your HT all day long, all of these HTs will perform well — especially if you switch to the low power options that most all have.

Where extended operation time is involved, something more is needed to pull off long-time continuous operation. This is where an external battery and its connections to various configurations or models of HTs being put to use can take form. The whole idea came up when I obtained a

Minolta digital camera to better describe and submit descriptions of conversions and items of note. This was in preference to not having to resort to the one hour (expensive) developing only to discover that I did not get what I wanted. Well, as with everything, there are pluses and minuses, and this digital camera had its own double-edged sword. The digital camera performed well, but

its operation with four (industrial-strength) alkaline cells lasted less than a half hour. It was a current magnet.

Well, something had to be done to enable a longer operation time without spending a lot of money on battery purchases. What was contemplated was an external battery of high amp-hour rating as could be found connected to the external battery jack on the camera. Of course, not using the original manufacturer's cord can take on ominous implications, especially if you reverse polarity during the construction and blow up the device you are attaching to. In other words, be very cautious and measure three and four times to be sure you have not made a simple error in your adaptation of an external battery and home-made cord. There is no room for error here, be very careful.

The cord I constructed for the IC-T81A was quite simple. I located the radio's external power jack at Radio Shack. It's a 3.5 mm o.d./1.3 mm i.d. part #274-1571A, so a small length of color-coded speaker wire or a length of wire from an old no-longer-used wall transformer can be used here. Be sure to include an in-line fuse of several amps for basic protection. Next, to ensure connection polarity when using several methods of connection, I broke the wire end and placed a two-conductor polarized molex/molded nylon connector pair (Radio Shack #274-222) to keep polarity from different ends proper. This was on the other end of the radio connection for cigarette lighter or belt pouch battery operation for portable use. This enables both mobile and portable operation with a simple cord patch. So far, there is about \$5 in parts in this, excluding the NiCds. See Fig. 1 for details on my cord for the IC-T81A.

If you have a similar radio and have jitters about constructing your own cord, Icom markets cords with a cigarette lighter plug (CP-12L) for car operation, and a less costly cord with wire ends for custom connections. The simple cord from Icom costs about \$12 (OPC-254L) and is suggested if you don't want to put your own cord together.

The search for suitable NiCds ended when I found several sets of 4-amp-hour computer batteries originally for a Toshiba 286 laptop computer. These were in original factory packages, and being for only a 286 computer, I knew they were orphans when I saw them. The dealer, having them on inventory for years, was glad to get rid of all of them for a few bucks each! What a find — if they would still take a charge. I figured they would be great, as they were never used or charged in over 5 years of sitting on a shelf.



Photo C. Size comparison of Yaesu VX-1 dual-band and Icom IC-T81A four-band HT.

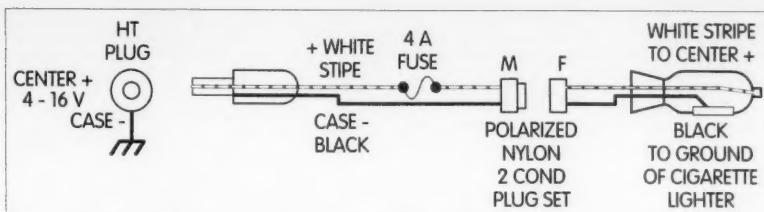


Fig. 1. Schematic of power cord that can be used either from cigarette lighter in auto or another nylon polarized connector for belt pouch long-life battery to extend HT operation time.

A test charge proved the batteries to be in great shape, if not original capacity. What a deal! The quest for large-diameter heat shrink, to make a professional pack, was abandoned due to its high cost. I wrapped my custom pack with paper center cores from paper towels, and electrical tape to insulate cells from each other. Construction here depends on the form you want to obtain from the finished cell layout, be it six in a row of two rows of three each, for example. If 12 volts is needed, a good configuration using "D"-size NiCds is three rows or three cells each. If you assume 1.35 volts for a fully charged cell, 9 cells work out to be 12.15 volts at full charge.

Other voltages are possible, depending on your needs. The Icom manual for the IC-T81A states that an external battery voltage of 4.5 volts to a maximum of 16 volts is possible. Be cautious with voltages above 16 volts, as when turning on the radio it will display "OVER V" and "UNPLUG THE RADIO IMMEDIATELY" to prevent damage to your radio. Most radios can stand a car's alternator charging voltage, which is over the nominal 12 volts, but mostly under 15 volts. I suggest that you verify your car's charging voltage to know what it is before connecting any device requiring 12 volts — just so you know what to expect. It's a prudent drill, and a simple test to make with a voltmeter.

Whatever your external battery pack form takes, it will provide you with many extra hours or even (as my pack does) several days of operations before charging is necessary. In the case of my digital camera, I purchased four Ni-MH to replace the internal "AA" cells and use them sparingly. The external "D" cell NiCd pack will give me quite a few hours and nearly a full day of operation compared to the 15 minutes on internal cells in the camera. Similarly, the lifetime of communications in portable or mountaintopping is greatly extended by the construction of this simple accessory, and no longer will you have to be confronted with the remark that your transmit is gobbling too much of your exhausted battery

and you are dropping out of communications. It has happened to me so many times — but no longer, as I just connect the remote accessory cable and battery, or cigarette lighter adapter, and I am back in business.

Just be careful in constructing any cable for external power, as there are many simple twists allowing you to connect power up with reversed polarity. Just remember to make your cable difficult if not impossible to connect improperly in respect to polarity. This simple step will ensure your radio good health. Once you let the smoke out, as you know, it's very difficult to put it back in.

From the universal power cable I originally made for mountaintopping, I thought I was very clever in putting large alligator clips on the battery end of the power cord. I had labeled the cords negative and black, and positive and red to ensure proper connection. However, it never occurred to me that in a heat of panic this was a simple connection that could have caused a fatal reversed polarity when trying to get equipment up to make a rare contact.

If you're faced with this situation, don't use the "suicide cord with clip leads." Make connections with similar two- or multi-connector nylon connectors. One to the battery and a mating connector to the equipment cord. Units of equipment that require different power or polarity use different nylon connectors peculiar

to this device. Now, in any panic during connecting cables with coded connectors, it is still nearly impossible to make an error in connections, and your valuable radio and accessories will be protected from improper polarity and connections.

Well, that's it for this month. Projects in the mill include some light wave transmitter and receivers of simple construction. Kerry N6IZW and I are experimenting with them, and if we complete trials and construction, we might have things ready for next month. If you have any questions, please drop me a note on the Internet at [clhough@pacbell.net]. Best 73, Chuck WB6IGP. 73

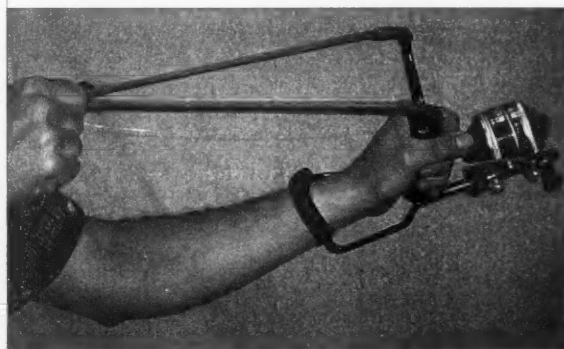
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More Software — RTTY on a Sound Card

I have come across a great program and have to tell you about it. The TrueTTY program URL, [www.dxsoft.com/], makes this software available, plus a logging program and another for CW. One of the nifty aspects of using a sound card program for RTTY is, at least in this case, that the connections between your computer and transceiver are the same as for PSK31. So, if you have been using one of the PSK31 programs, you already are hooked up to use TrueTTY.

There is also a PSK31 module in the program that allows you to work both modes from the same program. Even though I have been using Logger for some time, I find myself getting lazy when a lull in the RTTY activity comes along, and simply clicking on the PSK31 mode and chasing a slightly different warble tune.

A special attraction for me is the spectral tuning display. It works as well as any of the PSK31 waterfall displays, except it is wide, similar to DigiPan, and works the same in both modes. And that includes the Automatic Frequency Control, so you stay locked to either the RTTY received signal or the PSK31 signal. Plus, the button next to the AFC locks your transmitted signal to the same frequency as the one received.

The program is written by Sergei UA9OSV and he is doing a good job of supplying documentation in English for those of us who are Cyrillic-challenged. At the time of this writing, I have downloaded and installed updates to the program, and it appears the updates are coming at regular intervals.

Small inconveniences come with works in progress such as this beta version of shareware. But I found Sergei to be very cooperative when I messed up on the seemingly simple setup process. I thought I had all the ducks in a row, but when I told the program to transmit, a little window popped up and I could not continue beyond that point.

I found the program would work just like it was supposed to if I left my PT circuit disconnected and manually toggled the transmitter. Most of us get semi-accustomed to this with PSK31 before we rig a PTT circuit, so I was able to see the program in action before fixing the problem.

As a matter of fact, the accompanying screen shot was taken during this trial period. I was having too much fun to stop and worry about the minor abnormality of no PTT. Later, I E-mailed Sergei, gave him a description of the sequence of events as they appeared on the monitor, and it soon became clear where the problem lay.

There is a choice for using a full-duplex sound card and I had checked it. I was certain the SB16 was running full-duplex because that is the only circumstance that will allow the ChromaSound program to function. Sergei explained that should have been correct; however, in this case, it is necessary to not check that option. Once that is understood, the program functions like clockwork.

The program, as I mentioned, is shareware, but the only cripple built into the unregistered version is the fact you cannot save the setup. That doesn't sound like much of an impediment except you will find the default fonts are virtually unreadable. It is necessary to at least change the font in the receive window to prevent eye strain. There are two other areas in which you will find you will wish to alter the font as well and these get a little tiring. The \$35 registration fee puts an end to this repetitious effort. A small price to pay for convenience.

You will notice the screen shot says the program is unregistered, and it was at the time. That was when I was getting a real charge out of operating the program with manual PTT and watching it pick out signals and track them as well as "zero-beat" on those received signals so the transmitted signal was right on the money. What I am saying is that you can easily check out the program before you lay your cash on the line.

After a few RTTY contacts, I tuned over to the PSK31 signals and clicked to change modes, and the program was functioning in that mode. Simple as two mouse clicks and I was there. The same spectral display was in place, along with the macros which I would later learn to customize. The first obvious difference was the single tuning indicator as opposed to the RTTY pair in the spectral display.

As soon as I tuned to a signal, the familiar lower and upper case characters started appearing across the receive screen. I made a couple of contacts there and then felt it was time to fix the aforementioned PTT problem.

The biggest thing I missed with the program is something I need badly. I make many more than my share of typos, and PSK31 programs usually support sending a backspace to magically repair those errors I put on your screens. TrueTTY does not as yet support this feature. I had to get into the habit of sending a series of xxxx's instead.

As a matter of fact, I just observed another user of the program doing the same calisthenics for his typos. For a time, that will be an obvious identifier for those using the program in the PSK31 mode. Maybe, if we would persist in using this program, hams as a group would become better typists, thanks to Sergei.

That isn't as difficult as I make it sound, and Sergei tells me he will work on that part. I think of it as something that doesn't exist in RTTY and that is the original function of the software. PSK31 came later.

The other thing I miss, being a Logger fan, is a log. I make notes, then forget to bring up the logging program and make records. However, you will notice there is a fix for that problem on the DXSoft Web site.

They have their own logging program that works with the communications package. More goodies. At this time, I have not gone for the AALog. I am sure it is a good program and serves the user well, but I try to keep things simple. Is there an advantage to having more than one log? I don't really want to start down that road.

I must mention the fact that every ham I work remarks about the good quality of the signal they are receiving. This is true in either mode. I think that speaks well for the program. Though RTTY is a fairly straight-up mode, we have to recall how many tweaks we would make in a TNC to get it just right. This is more like plug-n-play than most of the professional, high bucks Windows95™ programs we install. And I have not received any complaints of overdriving on PSK31 which is an easy infringement. Of course, this is after having the system operating with other PSK31 programs.

After using this program on the air for the past two weeks, I find a lot of interest in a sound card program for RTTY. At least half the hams I mention it to ask for the URL. A few have gotten back to me via E-mail to

tell me their feelings on it. The bottom line is it is an easy install, the setup goes well (careful of the full-duplex check), all the operator functions are in place to take a test drive before you purchase, and it works with the same hookup as most PSK31 programs. Take a look.

New toy

Sometimes we profit from experience, even if it be reluctantly. In this case, I did a right thing first and purchased a kit in assembled form. The reason was that I was entering grounds never before traveled by this explorer. This made one part of the equation relatively secure and allowed for tweaking other areas to get things to work. The hesitation mentioned resulted only from my normally frugal approach.

You may have wondered the same thing I have about the ability of your computer to converse directly with your transceiver. I know there are readers who also use the Icom 735, and this will hit home there, but I am certain users of other brands and models can benefit from my recent experience.

I have been using Logger for some time now, and had observed the trials of hams getting the program to recognize the frequency of the radio. I wasn't sure just what was needed for an interface, because the owner's manual is fairly mute on this point. Then I found reference to JBI Products, saw they had an interface to do the job, plunked down the credit card, and about a week later had what appeared to be a plug-n-play toy.

Well, okay, it plugs in, but how do we watch it play?

I had a few programs around that were touted to allow a computer to control the 735. My first venture, however, was to load the Log-EQF program that came in the package because that should be sure-fire. I didn't really want a different logging program, though this appears to be quite a work of art.

At first glance, it appears to be "just a DOS program." It is, but then I started through the lengthy, well-written documentation and realized how well thought out the program is. After gaining enough knowledge to get the program into an operating mode, sure enough, the program

Source for:	Web address (URL):
TrueTTY — Sound card RTTY w/ PSK31	www.dxsoft.com/mirtty.htm
Pasokon SSTV programs & hardware	www.ultranet.com/~sstv/lite.html
PSK31 — Free — orig. PSK31 — also Logger	http://aintel.bi.edu.es/psk31.html
Site with links to PSK31 and Logger 6.12	www.mysite.com/k5fq
PSKGNR — Front end for PSK31	www.al-williams.com/wd5gnr/pskgnr.htm
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N1RCT site — excellent RTTY ref.	http://www.megalink.net/~n1rct/
Int'l Visual Communication Assn. — nonprofit org. dedicated to SSTV	www.mindspring.com/~sstv/
Creative Services Software	www.cssincorp.com
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Table 1. The chart from Hell(er) — your guide to good things on the Web.

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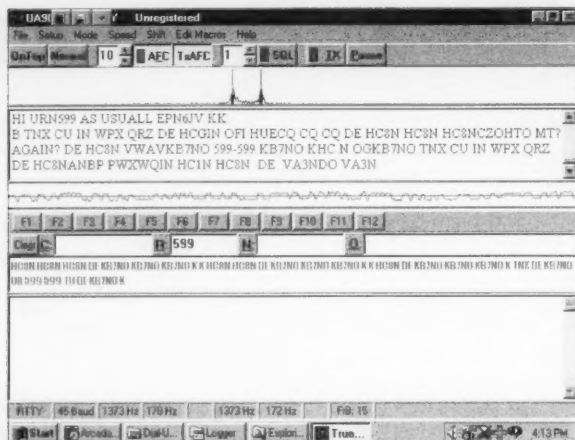
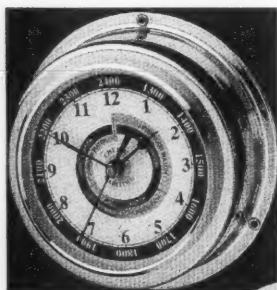


Fig. 1. TrueTTY screenshot. This was the second QSO using the program, hence the "unregistered" notation at the top. This should prove it isn't crippled as you download it. The five active portions of the screen start at the top with the wide spectral display. I find that it "copies" even when not tuned precisely, but the AFC will get it right on for you immediately. If you wish to tune quickly to an adjacent signal, you can do so by simply clicking on the displayed signal. Of course, this means your displayed frequency doesn't read correctly, but you will remain inside the band. The received text is displayed in the next area down. Just below that is the "oscilloscope" display of the received signal. The bottom two screens are the "sent" signals with the compose area at the bottom. I had captured this shot after the QSO was completed, so the compose area was empty. However, the program supports "type ahead," so I will usually have several lines ready and waiting when the other operator turns it back to me.

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was displaying the radio frequency. Great, it's gonna work!

On to the next test

This is getting easy. I had a program written by N1AED to control the 735 by way of the CT-17 interface which the JBI box is to replace. I loaded this and gave it a try and it worked. A little sluggishly and sometimes a bit on the peculiar side, but it was doing the things that the radio would allow. That is, it read frequency, changed frequency and modes, and applied memory already programmed into the rig.

Now was the time to go back and see how this worked for the desired purpose. With everything in

place and Logger working, it did not work. Boy, was I glad I tried the other stuff first.

The 735 has one problem for this application that I had several notes on. The information from the radio was coming at 1200 baud. Some programs obviously agree to that speed. Logger likes a little more

speed. As one ham put it, "The radio talks, but the program doesn't listen. One of them is female and the other is male."

There is a jumper to change in the radio, barely mentioned in the Icom manual, that allows the baud rate to be bumped up to 9600. At that point, Logger listens and life is better. Not best, just better. There is more.

For the Icom 735 enthusiasts in the group, the jumper is

J22. You can find it pictured in the manual. Looking at the jumper locations from the front of the radio and numbering them 1 to 5 from right to left, move the jumper from position 4 to position 5. That is all there is to that.

You will discover once you have arrived at this pinnacle of success that there are some things lacking. The first is, the PTT does not work through the interface. If you were using the serial port to key the rig when you click transmit, it no longer honors that command.

Also, the readings are often a bit strange. I first noticed the readouts did not track as I turned the dial, and then they were apt to catch up. But, whoa, then the reading might just go to 30,000 kHz or so, which upsets the program because there is a pop-up warning that you are operating out of band.

I have watched the Logger reflector and found other hams with similar experiences, and have not noticed a definitive cure. The "works-most-of-the-time" cures are tweaking the tuning knob just a little off, then back on frequency, changing to LSB, then back to USB, or clicking the snap button in the program. The most often effective cure for me occurs when there is a signal present and then it helps to change to LSB and back.

I would think this is a Logger problem, but I find the readouts were not up to par with other programs I had already tried, so it may be that this little radio just doesn't want the world to know what it is doing if we are too lazy to sit in front of it and operate the knobs and watch the dials (readouts).

The PTT problem was resolved, as I took the interface apart to be sure the DTR pin was accessible. It was, so I snaked a piece of audio cable through the interface so it exited through a hole I drilled in the case, and installed a serial jack on the new piece of dangling cable. I plugged the PTT cable into the jack and all systems were back to as normal as they get in this shack.

All these radios we deal with have their compromises, and this is only one of many. I talk to other hams, and almost everyone who gives a new mode a try finds a different problem. That must be where the sport enters into the equation, and that keeps making fodder for future columns.

If you have questions or comments about this column, E-mail me [jheller@sierra.net]. For now, 73, Jack KB7NO.

Dr. Rick Olsen N6NR
Western Washington DX Club
P.O. Box 538
Issaquah WA 98027-0538

The DX Dynasty Entities List

I am going to dispense with the column this month so that I can provide you with an updated DX Dynasty Award Entities list. We haven't published one in some time now, and I apologize for that. Look this over and tell me if I have left anything out. Vy 73 and gud DX!!

1AØ	SMO MALTA	5Y-5Z	KENYA	CEØ/A	SAN AMBROSIO
1S	SPRATLY ISLAND	6V, 6W	SENEGAL	CEØ/F	SAN FELIX
3A	MONACO	6Y	JAMAICA	CM, CO	CUBA
3B6	AGALEGA ISLAND	7O	YEMEN	CN	MOROCCO
3B7	ST BRANDON ISLAND	7O/S	SOCOTRA ISLAND	CP	BOLIVIA
3B8	MAURITIUS ISLAND	7P	LESOTHO	CQ, CT	PORTUGAL
3B9	RODRIGUEZ ISLAND	7Q	MALAWI	CT3	MADEIRA ISLAND
3C	EQUATORIAL GUINEA	7T-7Y	ALGERIA	CU	AZORES ISLANDS
3CØ	ANNABON ISLAND	8P	BARBADOS	CV-CX	URUGUAY
3D2	CONWAY REEF	8Q	MALDIVE ISLANDS	CY9	ST PAUL ISLAND
3D2	FIJI ISLANDS	8R	GUYANA	CYØ	SABLE ISLAND
3D2	ROTUMA ISLAND	9A, YU2	CROATIA	D2, D3	ANGOLA
3DA	SWAZILAND	9G	GHANA	D4	CAPE VERDE ISLANDS
3V	TUNISIA	9H	GOZO ISLAND	D6	COMOROS
3W, XV	VIETNAM	9H	MALTA	DA-DL,	
3X	GUINEA	9I, 9J	ZAMBIA	Y2-Y9	FED REP OF GERMANY
3Y/B	BOVET ISLAND	9K	KUWAIT	DM, Y2-Y9	EAST GERMANY
3Y/P	PETER 1ST ISLAND	9L	SIERRA LEONE		(before Oct. 2, 1990)
4J, 4K	AZERBAIJAN	9M2, 9M4	WEST MALAYSIA	DU-DZ	PHILIPPINES
4J1	MALYJ-VYSTOSKIJ	9M6, 9M8	EAST MALAYSIA	E3	ERITREA
	(M-V) ISLAND	9N	NEPAL	E4	PALESTINE
4K2, UA1	FRANZ JOSEPH LAND	9Q-9T	ZAIRE	EA6-EH6	BALEARIC ISLANDS
4L, UF	GEORGIA	9U	BURUNDI	EA8-EH8	CANARY ISLANDS
4P-4S	SRI LANKA	9V	SINGAPORE	EA9-EH9	CEUTA AND MELILLA
4U	UNITED NATIONS-	9X	RWANDA	EA-EH	SPAIN
	GENEVA	9Y	TRINIDAD & TOBAGO	EI, EJ	IRELAND
4U	UNITED NATIONS-	A2	BOTSWANA	EK	ARMENIA
	VIENNA	A3	TONGA ISLAND	EL	LIBERIA
4U1ITU	ITU HQ GENEVA	A4	OMAN	EM-EO,	
4U1UN	UNITED NATIONS-	A5	BHUTAN	UR-UZ	UKRAINE
	NEW YORK	A6	UNITED ARAB	EP, EQ	IRAN
4U1WB	WORLD BANK		EMIRATES	ER	MOLDOVA
4W	UNITED NATIONS-	A7	QATAR	ES	ESTONIA
	TIMOR TIMUR	A9	BAHRAIN	ET	ETHIOPIA
	(after March 1, 2000)	AP-AS	PAKISTAN	EU-EW	BELARUS
4X, 4Z	ISRAEL	BS7	SCARBOROUGH REEF	EX	KYRGYZSTAN
5A	LIBYA	BV	TAIWAN	EY	TAJIKISTAN
5B	CYPRUS	BV9	PRATAS ISLAND	EZ	TURKMENISTAN
5H, 5I	TANZANIA	BY, BT	CHINA	F	FRANCE
5H1	ZANZIBAR	C2	NAURU	FG	GUADELOUPE
5N, 5O	NIGERIA	C3	ANDORRA	FH	MAYOTTE
5R	MADAGASCAR	C5	GAMBIA	FJ-FS	ST MARTIN ISLAND
5T	MAURITANIA	C6	BAHAMA ISLANDS	FK	NEW CALEDONIA
5U	NIGER	C9	MOZAMBIQUE	FK/C	TX CHESTERFIELD
5V	TOGO	CA-CE	CHILE		ISLAND
5W	WESTERN SAMOA	CEØ	EASTER ISLAND		
5X	UGANDA	CEØ	JUAN FERNANDEZ		
			ISLAND		

Continued on page 50



Alinco's "Clear" DJ-V5

Alinco USA has released new "clear" or "see-through" versions of its popular DJ-V5 VHF+UHF hand-held transceiver. The DJ-V5TDC (dry cell pack) and DJ-V5TDCH

(NiCds) have only a faint coloration that appears as part of the manufacturing process. Most people see it as a slight blue tinge in the outer case that otherwise reveals the placement of PCB, display, lighting, speaker, and so forth.

These compact transceivers are designed to operate in the 2m and 70cm bands. They feature alphanumeric display, up to 5 watts power output, 200 memories, expanded receive capability offering coverage from 76-999.995 MHz (cellular-blocked), narrow and wide FM receive modes, and CTCSS encode and decode.

Some additional features include four scan modes, five programmable scan banks, automatic internal temperature protection, cable cloning, SMA antenna connector, 13.8 VDC direct input, four different European tone bursts, autodial memories, input voltage display with overvoltage warning, MARS/CAP capability, and adjustable AF audio tone. Alinco will continue to offer the black version of the radio, too.

For further info, contact Alinco USA, 438 Amapola Ave., Ste. 130, Torrance CA 90501; tel. (310) 618-8616; fax (310) 618-8758.

Ham Price Guide 2nd



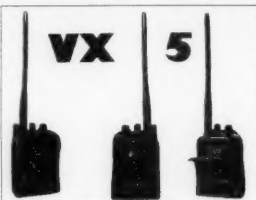
Ham Price Guide 2nd

This new hands-on book contains prices for 3,800 different ham items — prices

not from the Internet or someone's opinion, but actually taken from recent auctions or as advertised "For Sale."

Included are the date of the sale, claimed condition, and details about pertinent options, accessories, and manuals. 84pp., softbound, 8-1/2" x 11", \$11.95 plus \$2 shipping USA, \$4 elsewhere.

To order or for further info, contact Eugene Rippen WB6SZS, PO Box 9, Auburn CA 95604; tel. (530) 888-6020.



PowerPort VX-5 Radio Glove

This pouch, produced by Cutting Edge Enterprises, is a real winner. Besides coddling your VX-5 (or VX-500) in protective leather, it also solves a couple of complaints that VX-5 users sometimes have. One is that there just isn't a comfortable or secure place for the extra antenna tip with the radio. Another is that the belt clip won't stay on your belt.

The Radio Glove has a sturdy spring steel belt clip that bites your belt like an alligator, with a leather covering that

won't leave tooth marks. And there is a perfectly sized pocket at the back of the pouch that securely holds either extra tip and keeps it right there with your radio.

And it's beautifully crafted, too — nothing beats the feel or the smell of fine glove leather. The pouch's Velcro-style closure provides easy access to the display. The PTT button is still fully accessible while the radio is in the pouch, and the speaker holes are well placed for optimal listening. In fact, the leather seems to attenuate some of the high-pitched speaker hiss that may occur.

For further information or to order part #HI-51 (\$19.95), contact Cutting Edge Enterprises, 1803 Mission Street, Ste. 546, Santa Cruz CA 95060; tel. (800) 206-0115; E-mail [cee@cruzio.com].



New Soldering Station from Elenco

The SL-5 Soldering Station from Elenco is electronically controlled to provide 5 to 40 or 60 watts, and is ideal for professionals, students, hobbyists, and hams. The unit includes a holder funnel for the iron, sponge pad for cleaning

the tip, and on/off indicator light. A special safety feature is a ground fault detection circuit that warns you if you're not properly connected to earth ground.

This iron features a cushion-handle grip, and an easily replaceable grounded tip for static-sensitive devices. The base is made from heavy, non-slip steel, and the funnel can be mounted on either side.

For more information, contact Elenco Electronics, Inc., 150 W. Carpenter Ave., Wheeling IL 60090; tel. (800) 533-2441; fax (847) 520-0085; E-mail: [elenco@elenco.com]; site: [www.elenco.com].

If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio — and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for 73 Magazine."

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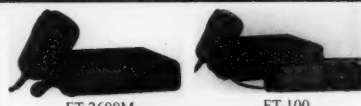
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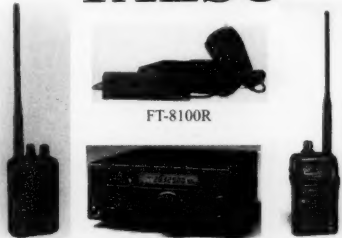


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4K1

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W6RO
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XT

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XU

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XW

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XX9

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XY, XZ

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YA

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YB, YC

INDONESIA

YI

IRAQ

YJ

VANUATU

YK

SYRIA

YL, UQ

LATVIA

YN

NICARAGUA

YO-YR

ROMANIA

YS

EL SALVADOR

YT, YU, YZ

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YVØ

AVES ISLAND

YV-YY

VENEZUELA

Z2

ZIMBABWE

Z3, 4N5,

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YU5

ZA

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ZC4

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ZD7

ST HELENA ISLAND

ZD8

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ZD9

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ZD9

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ZK1

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ZK2

NIUE ISLAND

ZK3

TOKELAU

ZL, ZM

NEW ZEALAND

ZL7

CHATHAM ISLAND

ZL8

KERMADEC ISLAND

ZL9/A

AUCKLAND ISLAND

ZL9/C

CAMPBELL ISLAND

ZP

PARAGUAY

ZR-ZU

SOUTH AFRICA

ZS8/E

PRINCE EDWARD
ISLAND

ZS8/M

MARION ISLAND

ZS9

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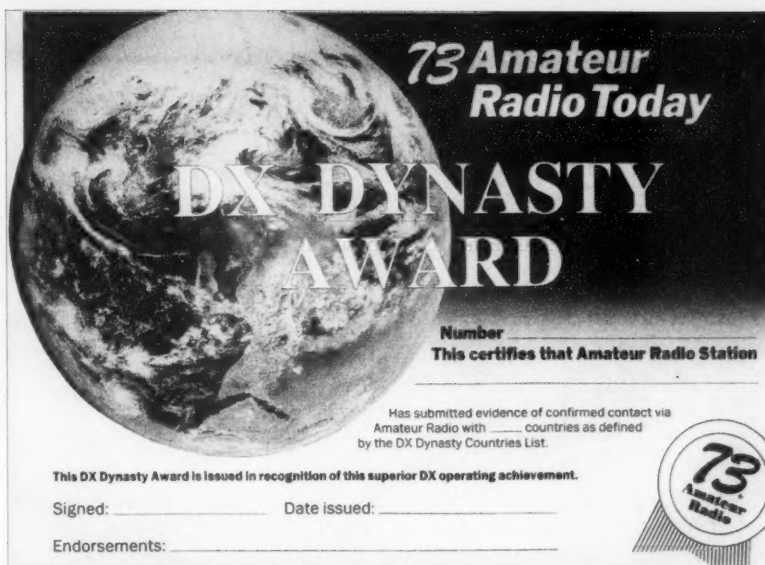


Photo A. The DX Dynasty Award Certificate.

QRP with the OHR 500

continued from page 26

the Colorado QRP Club had its weekly 2 meter net. So I asked a few check-ins to stay after and help me check my signal. Sure enough, I wasn't zero-beat. A quick realignment of the BFO fixed that, and it's been smooth sailing ever since.

I can easily key the rig with a straight key, a paddle and keyer, or a computer using contesting software and a basic serial/parallel port keying interface. I am getting quick responses even under the most trying of band conditions. Recently, during the first Second Class Operators Club Marathon Sprint (this really is another story), I decided to test out the OHR 500 at QRP levels, so I set it at 250 mW, and worked PA, CA, OK, TX, MN, WA, AZ, and FL.

The Florida QSO was with Bob Patten N4BP, founder and CEO of the Second Class Operators Club. I did a calculation on distance from my QTH in Colorado, and it worked out to be roughly 6,500 miles per watt. So I'll use Bob's QSL card and the OHR 500 to apply for my Miles-Per-Watt certificate.

The long and the short of it: You can't go wrong with the OHR 500. I would say that the rig is not for the beginning builder. But with one or two single-band rigs under your belt, I would have no hesitation in recommending that you tackle this five-band marvel.

As for the future, I plan to add a memory keyer to the rig, and I am building the Oak Hills Research DD-1 Frequency Counter/Digital Dial Kit to plug directly into the Oscillator Out jack in the back of the rig. Plus, you'll find the OHR 500 on the air during Field Day 2000 at the Colorado QRP Club's Aloha Field Day site west of Denver.

The OHR 500 is available from Oak Hills Research, A Div. of Milestone Technologies Inc., 2460 S. Moline Way, Aurora, CO 80014. Ph. (303) 752-3382. Orders, (800) 238-8205, Fax (303) 745-6792. E-mail, [qrp@ohr.com].

Now, if you'll excuse me, I need to get on the air. 73

Another Look at the NW-40

continued from page 40

and the transmit power can be adjusted up to 6 watts. If you haven't built any kits lately, try this one. You'll be the center of attraction at Field Day and bring in those extra bonus points — plus, you can join the QRP crowd on 40 meters.

The current price of a complete kit with audio filter and cabinet is \$130. Partial kits are available. Contact EMTECH at 1127 Poindexter Ave. W., Bremerton WA 98312. Their Web page is at [www.emtech.steadynet.com]. 73

Your Home Sat Station

Last month, we investigated advanced portable techniques for contacts via the FM, crossband repeater in the sky, AMRAD-OSCAR-27. OSCAR is an acronym for Orbiting Satellite Carrying Amateur Radio. Now it's time to look at the basics of a functional home station.

In 1980, the most common hamsat communications mode was mode "A", two meters up and 10 meters down. A typical home hamsat station consisted of a short-wave (HF) transceiver for downlink reception and some method of generating CW or SSB on the two meter uplink, usually with a transmit converter and amplifier. Multimode VHF radios were available, but expensive.

Antennas for reception ranged from indoor dipoles to multi-element Yagis. Uplink antennas were small VHF beams with two rotators, one for azimuth and one for elevation. Tracking was done with graphical aids like the OSCAR Locator. Home computers were not yet common.

Times have changed, but not that much. You can still get on mode "A" via two Russian hamsats; RS-12/13 and RS-15. It's fun and it works, but the most common mode today is "J", two meters up and 70 cm down. Most amateur-radio communications satellites have a mode "J" system on board. The "J" came from the transponder name assigned to the transponder on AMSAT-OSCAR-8 from JAMSAT in Japan.

The rig

There are many ham radios that can be used for satellite communications. Money is almost always the key factor. From new

to home-brew, the desired end result is to make contacts via the hamsats.

On the new and expensive end of the spectrum, an excellent do-it-all rig is the Yaesu FT-847. At around \$1750, this multimode, multimode transceiver can do almost anything from 160 meters through 70 cm. It has four antenna connectors; HF, six meters, two meters, and 70 cm. It can be set for full-duplex crossband operation between the separate external connections. This includes all of the HF/VHF/UHF satellite modes with the exception of "Mode K", 15 meters up and 10 meters down, on RS-12/13. Kenwood and Icom have their own versions of satellite radios. Watch for new ones to compete with Yaesu.

A less expensive way to prepare a home station is to use your current gear and augment it with older multimode VHF and UHF rigs from swapfests and on-line auctions. If you have been following the previous Hamsats columns, you know that a dual-band handie-talkie can be used for satellite contacts via AO-27 and SUNSAT-OSCAR-35.

In February, a new/old satellite was added to the fleet of FM hamsats. In January 1990, UoSAT-OSCAR-14 was launched. It began its on-orbit activities in the amateur bands as a digital store-and-forward packet satellite. It was the first 9600-baud hamsat, and it worked extremely well. After 18 months,

it was commanded to non-amateur frequencies for use by VITA (Volunteers in Technical Assistance). Now, eight and a half years later, the packet system has problems and is no longer useful by VITA. Chris Jackson G7UPN/

ZL2TPO at the University of Surrey in England has reconfigured UO-14's systems for use as a crossband FM repeater, once again in amateur operation. Unlike AO-27 that is active only for daylight passes, UO-14 is active all the time. The uplink is on 145.975 MHz and the downlink can be found on 425.070, plus or minus Doppler.

There is nothing wrong with a simple portable or mobile system for home-station use. With a constant power source and potentially better antennas, HTs and mobile rigs make a great start. For 10-meter reception, a simple monoband transceiver can add



Photo A. A Yaesu FT-847 tuned and ready for a UoSAT-OSCAR-14 FM-voice pass.



Photo B. Arrow Antenna of Cheyenne, Wyoming, offers a mounting bracket for home or stationary use of their Arrow II satellite antenna.

mode "A" reception. Check out some of the inexpensive 10-meter rigs from Copper Electronics of Louisville, Kentucky, at [<http://www.copper.com>].

Feedline

In your car or on the street, coax length is short, and the loss characteristics of the feedline are not an issue. Unless your home station antennas are within 20 feet of your rig, the coax cable becomes a point of concern. Use the best cable you can afford for UHF and VHF runs. Avoid small-diameter cable like RG-58. As a minimum, install Belden RG-8 or 9913. Avoid inexpensive off brands and cheap connectors with plastic dielectric (insulator) materials. HF-frequency coax runs are not as critical if the distance from the rig to the antenna is less than 100 feet. I use RG-8 on 10 meters and two meters, and 9913 on 70 cm. At 1.2 GHz I use 7/8-inch hardline, but that's another story. At 2.4 GHz, the down converter (13 cm to two meters) is mounted at the antenna.

Antennas

Once again, it is a proven fact that simple antennas can be used for satellite chasing. If you have an Arrow II antenna [<http://members.aol.com/arrow146/index.html>], or something similar, for AO-27 portable work, there's no reason it can't be used at home. In addition to the hole in the handle that has been predrilled for use with a camera tripod, Arrow offers a special mounting bracket to clamp the antenna to a pole.

There are many very inexpensive TV rotators that can be used on small satellite arrays like the Arrow II. While all TV rotators are designed for azimuth rotation, they can be adapted for elevation control with very little effort. Turn a typical rotator on its side and mount it to the top of the azimuth rotator. If this is prohibitively hard, mount it horizontally to a short pole coming out of the top of the azimuth rotator. The boom for the satellite antenna(s) is then passed through the new elevation rotator. Keep pole lengths short to avoid an unbalanced system. Also, if possible, put a cover over the modified elevation rotator. It was not designed for horizontal installation, and thus it will collect rain water and condensation in the wrong places. I have used a plastic wastepaper basket, with holes cut for the horizontal antenna boom.

If money is not a problem, you can spend a lot of it on satellite antennas and a rotator system. Cushcraft has some relatively inexpensive hamsat antennas, while KLM and M-Squared have some of the best, and most

expensive. Yaesu rotators are the most commonly used aiming systems, but they're not cheap. The G-5500 AZ-EL rotator system goes for \$650, but it will accurately position the largest hamsat array. My system includes an Alliance azimuth rotator and an older KLM elevation unit. I make a lot of satellite contacts, and it all works.

Tracking

Over the last few months I have been using "freeware" on my PC to track the hamsats. GrafTrack II and Silicon Ephemeris from W5SXD and WB5CCJ can be used on almost any PC. The latest version can be downloaded from [<http://www.rcallen.com>]. I have mentioned this site and software previously, and for good reason. It works well and is verified as Y2K-compliant. I have it running on a 550 MHz Pentium III and on a really slow antique POQET pocket PC. I have no complaints. On the minus side, it is DOS-based software and you will have to read the manual to use it.

Do you have a Palm Pilot (III, V, or VII)? If so, you can get PocketSat shareware that will provide fast accurate aiming data from [<http://www.palmgear.com>]. I finally figured out how to update my satellite data for the latest NORAD element sets, and it's been great. The shareware version is limited to tracking five simultaneous satellites, while the registered version can keep up with more than you will need. The registered version costs \$12.50 from Palmgear (URL above). Neither version will calculate

Wattmeter Winner

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power is exceeded. The third error displays if the reverse power level is greater than the forward power level.

I enjoyed building the kit and recommend it to anyone who is looking for something different to build. I look forward to many years of use. I have had very good success with both my

Borrow money from pessimists—they don't expect it back.

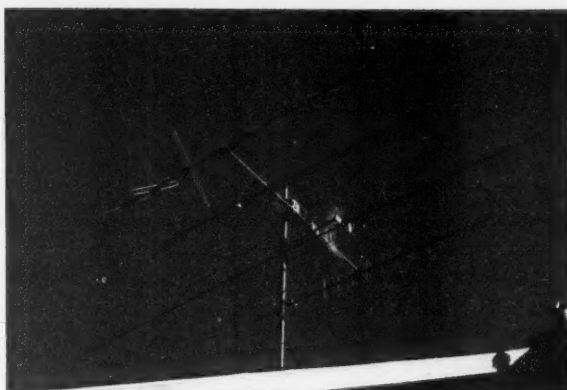


Photo C. The satellite antenna array at W5ACM has beams on two meters, 70 cm, and 23 cm, a semi-dish on 13 cm, and a 15-meter rotatable dipole.

passes for high, elliptical orbits (like AMSAT-OSCAR-10), but the software works fine with all the LEO (low Earth orbit) satellites.

On the air

For the last few months, I have provided a chart of orbits for AO-27. Now it's time for you to do your own tracking predictions. Try it. Check last month's column for more details on the mechanics of AO-27 chasing and investigate information from AMSAT, The Radio Amateur Satellite Corporation [<http://www.amsat.org>].

The big news

Phase 3D, the flagship project from AMSAT organizations around the world, has a launch commitment. Arianespace has announced that P3D is scheduled for a ride on Ariane flight 507 in July or August. We've been waiting for this for a long time. P3D is in French Guiana, and it's ready to go up. We're ready. Are you? 73

LDG autotuner and my LDG QRP autotuner. I'm looking forward to seeing what pops up next in their accessory line!

For further details and pricing information, contact LDG Electronics, 1445 Parran Road, St. Leonard MD 20685, USA; tel.: (410) 586-2177; fax: (410) 586-8475; E-mail: [ldg@ldgelectronics.com]; Web site: [<http://www.ldgelectronics.com/index.html>]. 73

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T-Hunting for ELTs

"We're practicing a search-and-rescue technique, officer!" That's how I tried to explain why my van was parked in front of three NO PARKING signs at the end of a winding street near Turnbull Canyon Road in rural Los Angeles County one Saturday night last year. Just a hundred feet beyond the locked fire road gate in front of the van was my half-watt transmitter and 11-element two-meter beam, scattering signals through the Rose Hills. Ten miles away in Fullerton, a half dozen cars full of radio direction finding (RDF) enthusiasts were trying to get bearings on it.

The nearest house was almost a quarter mile away, so the main purpose of the county's NO PARKING signs was to keep teenagers from gathering at the gate for stargazing and necking. Since my van, bristling with antennas, was probably a more powerful deterrent to party-seeking teens than a few NO PARKING signs, this officer decided to let us stay. It probably wasn't the first time he had encountered hidden transmitter hunters. (We call ourselves T-hunters.) There have been three Saturday night T-hunts every month in southern California for the past twenty years, so we're well known.

Admittedly, public service is often just a noble-sounding rationale for RDF sports. However, a few of our participating teams are quite serious about the search-and-rescue (SAR) aspect. For instance, Bob Miller N6ZHZ and Cathy Livoni KD6CYG have traveled hundreds of miles at all hours to

locate dozens of aircraft Emergency Locator Transmitters (ELTs, see **Photo A**) in southern California, as described in this column back in April 1994.

Other T-hunters have found ELTs just by being in the right place at the right time and knowing what to do. (See KJ6HZ's story in "Homing In" for November 1998.) If someone told you that an ELT was transmitting nearby, would you be able to track it down? My mailbox has brought several recent reports of hams who were up to the task.

Air show action

Last September, Steve Whiteside N2PON of Liberty KS got an unexpected chance to put his T-hunting skills to work. He had flown to the Tulsa Regional Air Show in Bartlesville OK in a friend's Beechcraft Musketeer, carrying his new Yaesu Air Pilot hand-held aircraft band transceiver. During

turned on my radio and started casually looking also. Removing the antenna killed the signal completely, and holding my hand over the base of the antenna would also knock down the signal, but that did not seem like a reliable attenuator.

"There were about a hundred show planes parked in the area," N2PON continued. "With no directional antenna, no attenuator, no S-meter, and a new, unknown radio, I was not very optimistic about locating the ELT. After some erratic searching, I remembered the 'body fade' technique. Standing between the rows of airplanes with my hand-held pressed against my stomach, I rotated to find the null. The ELT should then be behind me. The nulls were not consistent in direction, due to all of the reflections from people and airplanes, but I kept at it.

"Soon I could not get any null at all as I rotated my body. Then I remembered to tune off-frequency to attenuate the signal. Tuning to 121.400, I found a strong signal near two airplanes. The owner of one checked both his ELT and his neighbor's. They were OK.

"Moving farther up this row of airplanes, I had to tune further off frequency. As I reached the last aircraft in the row, I was tuned to 120.600 MHz and heard the signal. Upon checking at my request, the owner found that his ELT was on! Stowing baggage under the seat had probably tripped the switch.

"The total time I spent hunting was just twenty minutes. The new radio made the hunt more difficult because I did not yet know how it performed. Not having any RDF equipment available was discouraging, and I did not really expect to succeed. In retrospect, it's clear to me that the experience I gained by participating in the New Jersey

final approach, the tower asked all pilots to check their ELTs, because an emergency beacon was being heard on 121.5 MHz.

"After parking, we started looking at airplanes and I forgot about the ELT signal," Steve wrote. "About noon, a gentlemen walked past us using his hand-held to perform a methodical, row-by-row search for the ELT. So I



Photo A. This Emergency Locator Transmitter (ELT) mounts in the tail of a small plane and activates on impact. (Photo by Tom Curlee WB6UZZ)

10-70 club foxhunts enabled me to locate this ELT so quickly." Nice work, Steve!

The vast majority of ELT activations are accidental (**Photo B**), but these falsely triggered units have to be found and turned off quickly so that they do not cover signals from ELTs activated by genuine emergencies. And when such emergencies occur, haste is vital. ELT batteries may last only a few hours. Such was the case in western Massachusetts on October 5.

A mountain rescue

Timothy Ertl KE3HT of Dalton MA is one of several hams who are members of the Berkshire Mountain Search and Rescue group (BMSAR). At 0830 that day, he was called by fellow BMSAR member Don Horton N1ISB for possible participation in the search for a twin-engine Beechcraft King Air 200, believed to have crashed on Mount Berlin near Williamstown.

Massachusetts State Police, the agency in charge of the search, didn't officially activate BMSAR until 1100. As instructed, Tim, Don, and Ed Grosso N1FGY went to the Williamstown Fire Station to sign in and be transported by police all-terrain vehicles (ATVs) into the search area with their on-foot RDF gear.

"My portable 5-element beam was a bear to handle and still be able to hold on to the vehicle frame," Tim wrote about his ATV ride. "Our trip up the mountain had a few obstacles to overcome. The first was a bridge out, which required the ATVs to make a river crossing along some rocks, then climb the other side of the river bank. I took the chicken way out and crossed on foot. Then we had a couple of trees in the logging trails to go around, but we did not stop until we were facing an uphill slope that the ATVs could not climb.

"Out on foot, Ed took the south ridge, I took the center ridge, and an officer with no RDF equipment took the north ridge. Ed's receiver heard a rise in the noise, which is characteristic with AM signals, to his north. I was too close to the shadow of my ridge to hear anything, but I confirmed the position of Ed. My police officer used his compass to figure out which way was north of Ed. The officer to our north went farther north and picked up the scent of aircraft fuel. That led to the helicopters circling him, and the plane was spotted at about 1530 hours."

Unfortunately, the two men aboard the plane had been killed instantly in the crash. Nevertheless, the three BMSAR hams received praise from the State Police and a thank-you E-mail from a close friend of the passenger.

"We should have been started earlier in the morning," Tim added. "Then we would have gotten better bearings before the ELT battery ran down. The signal was almost gone by the time they actually got to the plane.

"Sometime in February, Don and I are going to give a presentation to the State Police," KE3HT concluded. "We'll cover what transmitter hunters can do — not just finding ELTs, but other services. We're also going to ask if they can notify us earlier, so we can start helping before the public is notified. We'll probably have to agree not to discuss our activities in detail on wide-coverage repeaters. They don't want a bunch of news reporters hearing us and running into the hills, messing up the scene."

Practice pays

Other groups like BMSAR know that preparedness and training make it possible to be successful in operations like this, especially when the distress signal is weak



Photo B. It's that one! Steve Kirkman KB6IMB (left) and Jim Frank KB6ONC of the Los Padres Search and Rescue Team use their RDF set to find a squawking ELT at the Santa Barbara airport. (Photo courtesy of Lou Dartanner N6ZKJ and Austin Rudnicki K6IA)

and erratic. Regular practice sessions can keep skills sharp and camaraderie high.

A recent practice event put on by the South Shore Foxhunters, a group on the other side of Massachusetts, was particularly well done. At 0900 on November 7, members met at headquarters of the Myles Standish State Forest. They were told that several people were hidden in the forest and that both the foxhunters and other SAR volunteers would try to find them. The major

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The Jersey Fireball 40

Every Novice knows that power is equal to voltage times current. So, a standard red LED will light up when two volts at 22 mA is applied to it. The total power required is about 44 mW. Give or take a milliwatt or two. That's not much power in anyone's book. But, on the other hand, I've talked to truck drivers using a signal generator, but that story is for another time.

Can you make a contact using 40 mW? Yup! Sure can! It's easy? All together now, can you say "frustration?" One of the hardest things to do when running milliwatts is finding out how many of them are being sent to the antenna. Sure, you can turn the power down on the ol' QRP rig, but most wattmeters cough and gag at power levels of less than one watt. There are two ways to do real milliwatting. One is to use a step attenuator, like the one for the Ten-Tec Argonaut II. Or to use a rig that will produce only milliwatts! You can't be tempted to crank up the power if you don't have the juice to crank up.

Meet the Jersey Fireball 40 transmitter

If you want milliwatts, then the Jersey Fireball 40 is a simple and easy-to-build ultra low power CW transmitter. On a really good day, this guy will squirt out 40 — that's right, 40 milliwatts — to the antenna. The Jersey Fireball 40 is the product of Clark Fishman WA2UNN. A sadist at heart, he designed the Jersey Fireball 40 to cover one of four possible bands. You can configure the Jersey Fireball 40 to work at 28.322 MHz, 14.160 MHz, 7.080 MHz, or 3.540 MHz. The Jersey Fireball 40 basic kit comes with the necessary parts for 40-meter operation. If you want to change bands, you select the correct jumper and then add the necessary filter components. The frequencies the Jersey Fireball 40 operates on are not easily changeable, but still very useful nonetheless. The reason? The Jersey Fireball 40 uses a TTL crystal oscillator "can" for the frequency-controlling component. You can only change frequency by changing the "can."

Here's how it works

The Jersey Fireball 40 uses the TTL 56 73 *Amateur Radio Today* • May 2000

oscillator frequency of 28.322 MHz. The output of the oscillator can be directed into two 74LS74 chips. Each one will divide the output of the TTL oscillator by two. So, 28.322 divided by 2 is 14.161 MHz. Divide this frequency again by two, and the results are smack in the high end of the 40 meter CW band, or 7.080 MHz. One more division by two, and whoa! You're looking at 80 meters with 3.540 MHz. For the ten-meter purist, the can is run straight through. The output of either the can (on ten meters) or one of the other frequencies is filtered by a 5-element elliptical filter. As I said, everything is set for 40 meters.

Keying of the Jersey Fireball 40 is done by grounding the TTL oscillator. I found the keying to be a bit hard, but that's OK, too. You kind of want the keying to be a little on the hard side, so your signal stands out from the birdies in the guy's receiver.

The entire Jersey Fireball 40 is operated from a +5 volt supply provided by the on-board LM78L05Z regulator. The input voltage can be anything from 9 to 14 volts. A nine-volt transistor battery would be an ideal power source for the Jersey Fireball 40.

Options galore

Just like an SUV, you can get the Jersey Fireball 40 loaded with two very important options. First, you can add the TiCK keyer. The TiCK is a slick super-small iambic keyer on a chip. There's a PGM connector on the bottom of the PC board for controlling all the magic the TiCK keyer will do.

The other option is the one I installed. It's the one-watt amplifier! Now, I am going to sound like my buddy Randy KD8JN, and say I only turned it on when I needed to. But that one watt is a hell of a kick from 40 milliwatts. The amplifier uses a 2N2222A transistor.

Building the Jersey Fireball 40

The Jersey Fireball 40 is assembled on a double-sided PC board. The board measures 2" x 3". There is no silk-screen, but some of the part locations are etched into the board. You get just the basic components for the 40-meter band. Also missing are the amplifier parts, and of course the TiCK keyer.

Assembly is quick; most of the active parts are IC chips. You need to wind the filter toroids and install the various capacitors for the filters. You should be able to stuff the PC board, wind the coils, and put it on the air in less than two hours.

You'll need some sort of T/R switching. The Jersey Fireball 40 does not have any means of switching the antenna from the receiver to the Jersey Fireball 40. There is no sidetone, either. I used the T/R controller I did several years ago. As for a receiver, my old Heathkit HR1680 worked for me.

Testing

About the only thing you have to do is to check your work on the PC board, and apply power. Be sure you have the output into a 50-ohm load, and key the rig. You can listen to yourself on a receiver. The keying should be nice and clean, if it is a bit too hard for your liking, you can add a .01 capacitor to the key line to soften the keying up. That's about the only thing you have to do to get this guy on the air.

How does it work?

Well the Jersey Fireball 40 works just great on the test bench. Making QSOs with it is another matter. Oh, don't misunderstand

Continued on page 62

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Good Operating, and a New Headset on the Block

There are two things in particular that make writing this column so much fun. The first is the chance to meet great people with whom to share ideas, and the second is the chance to play with some great toys. This month I've had a chance to do both, and both may well improve my operating ability.

A couple of issues back, I wrote about the fun of ten meter FM. I included a chart showing some of the frequencies in common usage. Of course, the fact that a frequency is in common use for a particular purpose does not mean that it in fact *should* be used for that purpose. One frequency that is commonly used for simplex communications, 29.480 MHz, should not be used for 10 meter FM since it is primarily used for satellite communications. I received a note from K5OE by E-mail pointing this out, and he mentioned that this use was listed in the *Courteous Operator's Guide*. Thanks for the heads up, Jerry.

Jerry's message got me to thinking about some of the real advantages of this hobby. As a group we tend to look at one another as compatriots. We also tend to try to work things out among ourselves rather than waste a lot of effort assigning blame. These civilities were once more common and are still the norm among hams, which says a lot about us as a group. Although we are governed by the FCC rules and regulations, we also adhere to our own guidelines, which are often referred to as "Good Amateur Practices." These include routine courtesies and the ARRL's Amateur's Code. We do these things not because we are forced to, but because it makes for a better hobby.

While it's always easy to point out what "they" should do to make this a better hobby, it's a little harder, although more productive, to determine what "we" should do. In my case, I decided to do the following:

Take the time to re-read the Amateur's Code (found in the *ARRL Handbook*). This code lists six key concepts: The amateur is Considerate, Loyal, Progressive, Friendly, Balanced, and Patriotic. Sometimes these old-time values are the best guide.

Review Part 97, the regulations that govern Amateur Radio. Even without the license restructuring, there were some changes with which I was not as familiar as I should have been. There are a number of Web sites that provide current copies of the rules, including the league's home page [www.arrl.org].

Keep a copy of the *Courteous Operator's Guide* near my rig (and my word processor) — and double check it for competing uses of a frequency!

Make sure that I think to check my transmitter output. Am I only using the minimum power for the QSO in which I'm engaged? And, finally, I'm going to consciously pause before pressing the push-to-talk button to give someone else a chance to call, particularly on 2 meters. After all, there rarely is something so important that I have to say that it can't wait for an additional second or two.

It's always possible to do something just a little better, and doing it better should be no inconvenience when it involves something as enjoyable as this hobby. I'm going to do these things now to improve my operating, and also I'm going to do a self-check every so often just to see what other areas I can be better at. Any ideas you might have to improve the hobby? Drop me a note.

A few months ago, I was involved in helping the hospital

where I work coordinate some emergency communications plans. Since there is the distinct risk of flooding due to tidal surge during hurricanes, the contingency plans include provisions for all critical departments located on the first floor to be relocated to higher ground. The telephone switchboard, for example, has a backup location on the second floor. This backup location is planned as a communications hub with telephone equipment as well as antenna connections for two hospital radio systems, the county emergency radio system, and the two meter amateur band. Since the room is rather small, I began to think of how noisy it would be if all these communicators were trying to do their jobs at the same time. Since losing the ground floor means that space would be at a premium, this may be the best or only location for a ham station. I realized that a headset with a boom microphone would prove

Continued on page 62



Photo A. Comfortable to wear and featuring clear audio, the Warren Gregoire TR-2000 headset has a noise-canceling microphone and either PTT or foot switch for transmitting. KE8YN/4 models.

CALENDAR EVENTS

Number 58 on your Feedback card

Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the August issue, we should receive it by May 31. Provide a clear, concise summary of the essential details about your Calendar Event.

MAY 6

CADILLAC, MI The Wexauke ARC will hold their Annual Amateur Radio and Computer Swap Meet on Saturday, May 6th, from 8 a.m. to 1 p.m., at the Cadillac Jr. High School. Talk-in on 146.98 rptr. Free parking. Admission is \$5. Tables \$8 for an 8 ft. table. For table info contact NU8L, (231) 862-3774; or E-mail [amcconnell3@hotmail.com]. There will be VE exams at 10:30 a.m. Contact WA8LKV, (231) 829-3433 or E-mail [avanant@netonecom.net]. You must pre-register for testing.

CEDARBURG, WI The Ozaukee Radio Club will sponsor its 22nd Annual Cedarburg Swapfest, 8 a.m.-1 p.m. at the Circle-B Rec. Center, Highway 60 and County I (located 20 miles north of Milwaukee, west of Grafton). Admission \$4, both in advance and at the door. 4-ft. tables are \$5 (limited power on request). Seller's setup at 6:30 a.m. VE exams start at 9 a.m. Talk-in on 146.37/.97 and 146.52. For tickets, table reservations, maps or more info, send an SASE to Joe Holly, ORC Swapfest Chairman, 1702 Holly Lane, Grafton WI 53024. Tel. (262) 377-2137.

SILOAM SPRINGS, AR The Siloam Springs ARC Hamfest and Flea Market will take place at St. Mary's Catholic Church at 1996 Hwy. 412 East in Siloam Springs AR. Hours are 8 a.m.-3 p.m. Talk-in on 146.67. Computer seminars will be held during the hamfest. Contact Matt Hyde N5UYK at (501) 524-4797.

OWEGO, NY The Binghamton ARA will host the 2000 Owego Hamfest, May 6th, starting at 8 a.m., at Tioga County's Marvin Park Fairgrounds. Setup for vendors and tailgaters at 6 a.m. Indoor vendors who require Friday setup, call ahead of time. Admission \$5. Tailgate spots \$2. Indoor tables \$10 ea. VE exams will be conducted in a quiet setting at the school next door. For more info, or to reserve an inside table, E-mail [rmess@binghamton.edu]; or call Bill Coleman N2BC, (607) 748-5232; or write to BARA, P.O. Box 853, Binghamton NY 13902-0853.

MAY 6-7

ABILENE, TX The Key City ARC will sponsor their 15th annual Hamfest at the Abilene Civic Center from 8 a.m.-5 p.m. Sat., May 6th, and from 9 a.m.-2 p.m. Sun., May 7th. Free parking. VE exams. Wheelchair access.

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Limited RV parking for a nominal fee. Tables \$6 each. Pre-registration \$7 (must be received by May 1st), \$8 at the door. Talk-in on 146.160/.760. For reservations and info contact Peg Richard KA4UPA, 1442 Lakeside Dr., Abilene TX 79602; tel. (915) 672-8889. E-mail [ka4upa@arrl.net].

MAY 7

HAGERSTOWN, MD The Antietam Radio Assn., Inc.'s 8th Annual Great Hagerstown Hamfest & Computer Show "The Millennium Hamfest" will be held at Hagerstown Community College Rec. Center. From Interstate 70, take Exit 32B to Edgewood Dr. (Home Federal bank on right). Turn right. Drive 1.4 miles. Entrance to the college is on the left. Follow signs. From the north or south, take Interstate 81 to Interstate 70 East. Follow directions as above. Talk-in on 146.94 and 147.09 rptrs. (W3CWC). Gates open at 6 a.m., building opens at 8 a.m. General admission \$5, children 12 and under free. Tailgating is an additional \$5 per space on an asphalt tailgate area. New and used computers and supplies, and ham radios will be the featured items. VE exams by the ARRL VEC Team, on the 2nd floor of the Rec. Center. Walk-ins OK at 8:30 a.m. For more info contact Greg Lanham WA4VE, (540) 772-4792. E-mail [kuan@visuallink.com]. There will be an ARRL forum at 10 a.m., and an ATV forum at 11 a.m.

YONKERS, NY The Metro 70cm Network, WR2MSN, will sponsor a Computer and Electronic Flea Market, May 7th, at Lincoln High School, Kneeland Ave., Yonkers NY, starting at 9 a.m. Vendors setup at 7 a.m. Free parking. Admittance \$6, under 12 years free. Talk-in on 440.425 PL 156.7 and 146.910 PL 114. Vendors, call WB2SLQ after 7 p.m. at (914) 969-1053; or E-mail [Wb2slq@juno.com] to register. The Metro 70cm Network is an emergency communications network covering 4 states.

MAY 20

FORESTDALE, RI The Rhode Island Amateur FM Repeater Service, Inc., which operates the 146.76, 146.94, 223.76 and 447.425 repeaters in Rhode Island, will hold their annual Spring Flea Market and Auction at the VFW Post 6342, Main Street, Forestdale (No. Smithfield) RI on Saturday, May 20th. Take the Forestdale exit off Route 146 in No. Smithfield; take a left

at the end of the ramp and go six tenths of a mile to the Post on your right, just before the Village Haven Restaurant. Please observe parking instructions. The flea market opens at about 8 a.m. and spaces are \$5 each. Some spaces are available under the pavilion on a first-come, first-served basis. The auction will be held 11 a.m.-3 p.m. Talk-in on 146.76. For more info, contact Rick Fairweather K1KYI, 106 Chaplin St., Pawtucket RI 02861; tel. (401) 725-7507 between 7 and 8 p.m. only. E-mail [k1kyi@arrl.net].

MAY 21

FAIR OAKS, CA The North Hills Radio Club of Sacramento CA will hold its annual Swapmeet at Bella Vista High School, 8301 Madison Ave., Fair Oaks CA. From I-80 (Sacramento-Roseville), go east on Madison Ave. for 5.8 miles to the high school on the left. From Highway 50, go north 2.6 miles on Hazel Ave. to Madison Ave.; turn left onto Madison Ave. for 1.4 miles. The school is on the right. Seller spaces (2 car stalls) are \$10. Free parking for buyers. For more info contact Earl S. Mead K6ESM, (916) 331-1115; or E-mail [nhrc@k6is.org]. Check the Web at [http://www.k6is.org].

MAY 26-27

PASCAGOULA, MS The Jackson County ARC will hold its 6th annual Hamfest in the Civic Center at the Jackson County Fairground, 5 p.m.-9 p.m., Friday May 26th; and 8 a.m.-2 p.m. Saturday, May 27th. Talk-in on W5WA 144.510/145.110. Dealer setup begins on Friday at noon. Tickets are \$2.50, no more than \$10 for immediate family. Tables \$8/8 ft. table. RV parking available on site. VE exams 11 a.m. Saturday. The test fee is \$6.65 and it is mandatory that you bring a picture ID, your original license and license copy. No charge for Novice testing. E-mail [montehat@datasync.com] or [irag@mindspring.com] to request a flyer. For more info contact Hamfest Chairman Charles F. Kimmerly N5XGI, 19000 Busby Rd., Vancleave MS 39565. Tel. (228) 826-5811.

MAY 28

WEST FRIENDSHIP, MD A Hamfest will be held by the Maryland FM Assn., at Howard Co. Fairgrounds, 8 a.m.-2:30 p.m. Take I70 to Rte. 32, S to Rte. 144; turn right, go W on Rte. 144,

approx. 1 mile to the fairgrounds. Talk-in on 146.76, 224.76, or 444.00. Admission \$5. Tables \$20 in advance, \$25 at the door. Tailgate space is \$5 per space. For reservations, contact **Mike WA3TID**, P.O. Box 19, Annapolis Junction MD 20701. Tel. (410) 923-3829.

JUN 3

GRAND RAPIDS, MI The annual IRA Ham-festival, West Michigan's largest hamfest, will be held at the Hudsonville Fairgrounds near Grand Rapids. Talk-in on 147.16 link rpt. system. Doors open at 8 a.m. for general admission. Free parking. Dealers can setup on the 2nd after 7 p.m., or after 6 a.m. on the 3rd. Bring your ham equipment, coax, computer equipment, software, books, wire, jewelry, sweat-shirts etc. to sell. Hams, bring your used equipment to trade or sell. Computer hobbyists, bring your excess hardware, software, books, etc. to trade or sell. Overnight camping is available, \$10. VE exams at 10:30 a.m. Indoor table space, 8 ft. tables \$8 each. 10 ft. trunk sales spaces, \$6. Contact **Kathy at (616) 698-6627** from 4 p.m. to 7 p.m. EST. Visit the Web at [<http://www.iserv.net/~w8hvg>].

SPRINGFIELD, IL A Hamfest will be held June 3rd at Illinois State Fairgrounds. Enter Gate 11. This event is being co-sponsored by Sangamon Valley Radio Club & Shooting Stars 4-H Club. Talk-in on 146.685(-). Flea market opens at 6 a.m.; building opens at 8 a.m. Tables \$5 in advance. Admission tickets \$5 each. No extra charge for covered flea market spaces. ARRL VE exams. For more details contact **Ed Gaffney KA9ETP**, 13977 Frazee Rd., Box 14A, Divernon IL 62530. Tel. (217) 628-3697; or E-mail to [egaffney@family-net.net].

JUNE 4

MANASSAS, VA The Ole Virginia Hams ARC, Inc., will hold Virginia's Olde Fashioned Manassas Hamfest at Prince William County Fairgrounds, 1/2 mile south of Manassas VA on Route 234. Talk-in on 146.97(-), 224.660(-), and 442.200(+). Indoor exhibitor space, 8 ft. tables \$30 each, with chairs and electricity. Setup 2 p.m.-10 p.m. Saturday. General admission is \$5 per person at the gate. No advance sale. Gates open at 7 a.m. Free parking. Tailgating \$5 per space (plus admission). Gates open at 6 a.m. Setup 2 p.m.-10 p.m. Saturday. Find directions, details, and hotel info at the Web site [<http://www.qsl.net/olevahams>]. Dealers, contact **Jack N4YIC**, (703) 335-9139; Fax: (703) 330-7987; E-mail [N4YIC@arll.net] or [patnjack@erols.com]. For general info, contact **Mary Lu KB4EFP**, tel. (703) 369-2877; E-mail [mblasd1638@aol.com].

QUEENS, NY The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open

for vendors to set up at 7:30 a.m. Buyers admitted at 9 a.m. Free parking. VE exams at 10 a.m. Admission by donation, buyers \$5. Sellers \$10 per space. Talk-in on 444.200 rpt., PL 136.5; 146.52 simplex. Contact (eves. only) **Stephen Greenbaum WB2KDG**, (718) 898-5599. E-mail WB2KDG@Bigfoot.com or **Andy Borrok N2TZX**, (718) 291-2561; E-mail [N2TZX@webspan.net]. For info about the VE exams, contact **Lenny Menna W2LJM**, tel. (718) 323-3464, or E-mail [LMenna6568@aol.com].

SPECIAL EVENTS, ETC.

MAY 5-7

MARTHA'S VINEYARD ISLAND, MA The Fall River ARC will operate W1ACT portable from the Gay Head Lighthouse on Martha's Vineyard (IOTA NA-046). Frequencies: 14.260, 21.260, 28.460 and 146.55 MHz. Operation will start May 5th at 18:00 UTC and end May 7th at 21:00 UTC. Please QSL SASE via N1JOY.

MAY 6-7

CONNECTICUT QSO PARTY The Candlewood ARA will sponsor the Connecticut QSO Party 2000Z May 6th-2000Z May 7th, with a rest period 0400Z-1200Z. Phone, RTTY and CW. Work stations once per band and mode, mobiles as they cross county lines. No repeater QSOs. Single operator, fixed/mobile, Novice, QRP (5W), Multi-single Multi-multi classes plus Connecticut club competition. Connecticut stations may contact other Connecticut stations for QSO/multiplier credit. Connecticut stations exchange report and county; others exchange report and state/province/DXCC country. Non-CT stations work CT stations only. CW — 40 kHz up from lower band edges; Novices 25 kHz up from low end. Phone—1.860, 3.915, 7.280, 14.280, 21.380, 28.380. VHF — 50.150, 144.200, 146.580. RTTY — Normal RTTY bands. All bands (HF, VHF, UHF) except WARC bands count. Score

one point per phone QSO and two points per CW or RTTY QSO. QSOs with club station W1QI and ARRL HQ station W1AW count 5 points. Connecticut stations multiply QSO points by states/provinces/CT counties worked (DX only one multiplier); others multiply by CT counties worked (work CT stations only). Plaques and certificates (100 point minimum). Special certificate for working all 8 Connecticut counties. Send entry and SASE for results by June 7th to CARA, P.O. Box 3441, Danbury CT 06813-3441.

MAY 20

WINFIELD, IL The DuPage ARC, in commemoration of Armed Forces Day, will operate Special Event Station W9DUP, 1630Z May 20th-2300Z May 20th. Operation will be on 7.250, 14.290, 28.400 and 145.25/144.66 MHz. Stations may request a certificate. QSL with an SASE to **John McCarty N9HRT**, DuPage ARC, P.O. Box 71, Clarendon Hills IL 60514.

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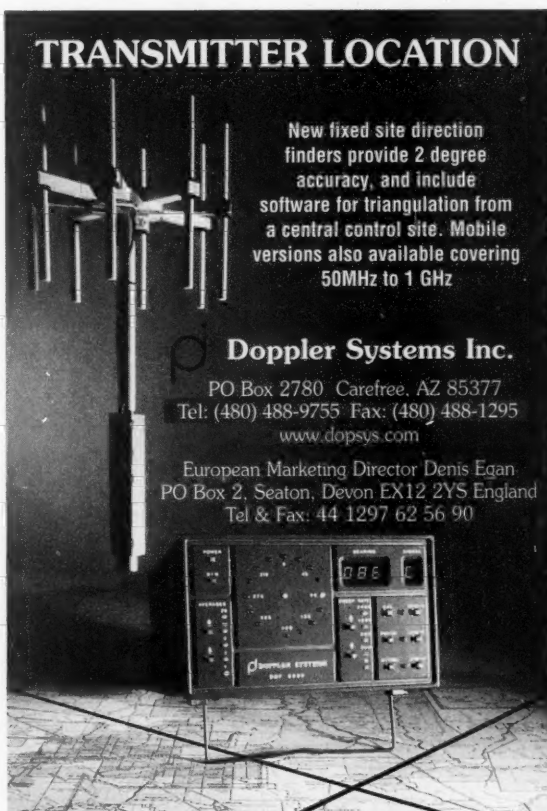
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Unusual Activity and a Conjunction, Too!

You can expect some exceptional solar activity accompanied by severe ionosphere and magnetic field disturbances during the second and fourth weeks of this month.

In fact, it is possible that intense aurora will occur around the 8th and 24th of this month, whereas the first and third weeks are expected to provide Fair to Good propagation conditions on the HF bands. Check the VHF bands during the second and fourth weeks for unusual activity and some long-haul DX on six meters during a few days. We are now approaching the solar maximum of Cycle 23 and the summer solstice, whose

effects combine to provide the unusual activity described this month.

Please be aware that extreme weather and possibly other severe geophysical upsets may be expected in the northern

May 2000

SUN	MON	TUE	WED	THU	FRI	SAT
	1 F	2 F-P	3 P-F	4 F	5 F-P	6 P
7 P-VP	8 VP	9 VP-P	10 P	11 P-VP	12 VP-P	13 P-F
14 F	15 F-G	16 G	17 G	18 G	19 G	20 G
21 G-F	22 F-P	23 P-VP	24 VP	25 VP-P	26 P	27 P-F
28 F	29 F	30 F-G	31 G			

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	10/12		20				17/20	20			15/17	10/12
ARGENTINA	15/17	15/17	20	30/40	30/40		10/12				12/15	12/15
AUSTRALIA	10/12	17/20	20	20	20	30/40	30/40	17/20				10/12
CENTRAL AM.	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12
ENGLAND	17/20	30/40	40/80	40/80	30/40		15/17	10/12	15/17	15/17	17/20	
HAWAII	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20				10/12
INDIA	17/20	17/20					15/17					
JAPAN	10/12		17/20				17/20	17/20			15/17	10/12
MEXICO	12/15	20/40	20/40	20/40	20/40	15/17	15/17	10/12	10/12	10/12	17/20	10/12
PHILIPPINES	15/17		17/20	17/20			17/20	15/17	10/12			15/17
PUERTO RICO	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12
RUSSIA (C.I.S.)	30/40	30/40	17/20	17/20			10/12	10/12	12/15	17/20	17/20	
SOUTH AFRICA	20/30	40	20/30	20/30				10/12	10/12	12/15	12/15	
WEST COAST	20/30	20/30	20/30	30/40	30/40		10/12	10/12	10/12	15/17	17/20	

CENTRAL UNITED STATES TO:

ALASKA	10/12	12/15	17/20	17/20	20		17/20	17/20				10/12
ARGENTINA	15/17	15/17	20/30	20/30	17/20		10/12				10/12	12/15
AUSTRALIA	10/12	15/17	15/17		17/20	20/30	30/40	17/20			12/15	10/12
CENTRAL AM.	15/17	15/17	17/20	17/20	20/30		10/12	15/17	10/12	10/12	10/12	
ENGLAND	30/40	30/40	30/40					12/15	12/15	17/20	17/20	
HAWAII	12/15	15/17	15/17	17/20	17/20	20/30	30/40	17/20		10/12	12/15	12/15
INDIA	15/17	17/20						12/15	12/15			
JAPAN	10/12	12/15	17/20	17/20	17/20		17/20	17/20				10/12
MEXICO	10/12	15/17	17/20	17/20	17/20		10/12	10/12	10/12	12/15	12/15	
PHILIPPINES	10/12		15/20	17/20				10/12	10/12			
PUERTO RICO	15/17	15/17	20/30	20/30	20/30		10/12	10/12	10/12	10/12	10/12	
RUSSIA (C.I.S.)							12/15	12/15	12/15	17/20	17/20	
SOUTH AFRICA			17/20	17/20				12/15	12/15	15/17	17/20	

WESTERN UNITED STATES TO:

ALASKA	10/12	10/12	15/17	17/20	17/20		17/20	17/20				15/17
ARGENTINA	10/12	12/15	15/17	17/20	17/20						10/12	10/12
AUSTRALIA	10/12	12/15	15/17	15/17	17/20	17/20		17/20				
CENTRAL AM.	10/12	12/15	15/17	17/20	30/40			10/12	10/12	10/12	12/15	
ENGLAND	17/20	17/20						15/17	15/17	17/20	17/20	
HAWAII	10/12	10/12	12/15	15/17	20/30	20/30	30/40		12/15	10/12		
INDIA		15/17	17/20						12/15	15/17		
JAPAN	10/12	10/12	12/15	17/20	17/20	17/20		17/20				15/17
MEXICO	10/12	12/15	15/30	17/30	20/30			10/12	10/12	10/12	12/15	
PHILIPPINES	10/12	10/12					17/20	15/17	17/20			
PUERTO RICO	10/12	12/15	15/30	15/30	17/30			10/12	10/12	10/12	12/15	
RUSSIA (C.I.S.)	17/20				17/20		17/20	17/20	20	20	20	
SOUTH AFRICA	17/20	20		20					10/12	12/15	12/15	
EAST COAST	20/30	20/30	30/40	30/40	30/40		10/12	12/15	12/15	15/17	17/20	

hemisphere this month, particularly on the 8th-11th and the 23rd-26th.

For avid sky watchers and early risers, look for a Jupiter/Venus conjunction at sunrise on May 17th, but only 3 degrees above the horizon and 7 degrees from the Sun, making possible viewing difficult. On the evening of May 18th, Mars and Mercury will be close together, very low in the WNW after sunset, but could be masked by the Sun's glare. Forty minutes before local sunrise on the morning of May 28th, there will be a Jupiter/Saturn conjunction, but they could be too close to the Sun (15 degrees) and masked

by solar glare. On the morning of May 31st at about 40 minutes before sunrise, there will be a Jupiter/Saturn/Moon configuration about 2 degrees above the horizon, with the Moon about 10 degrees to the upper right. Again, possibly difficult to see.

General band-by-band forecast:

10 and 12 meters

Fairly regular DX may be expected on Good (G) days to Europe and the East before noon, and to Africa shortly after noon. Also, you may find good band openings to South America, the Pacific, and the southern hemisphere during the afternoon. Short skip between 1,000 and 2,000 miles during the day is anticipated for most days.

15 and 17 meters

You can look for excellent daytime DX to the southern hemisphere and to most areas of the world, peaking to Europe before noon and to most other areas of the world during the afternoon; daytime short skip beyond 1,000 miles will be frequent.

20 meters

Excellent DX openings to most areas of the world are expected on Good (G) days

from local sunrise until long after sunset. Peak conditions should occur an hour or two after sunrise and again in the late afternoon. On Good (G) days, DX into the southern hemisphere can be worked during the hours of darkness as well. Short skip from 500 to over 2,000 miles is anticipated on most days.

30 and 40 meters

These may be your best DX bands from local sunset until sunrise, when you can expect frequent openings and often strong signals into the southern hemisphere. Daytime short skip to about 1,000 miles is expected, and beyond 750 miles after dark.

80 and 160 meters

Worldwide DX can be expected from local sunset through the darkness hours on Good (G) nights, limited of course by thunderstorm static on some paths. Short skip at night will extend between 1,000 and 2,000 miles. 73

When Less is More

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about joining—to quote their pamphlet, CQC is “A Colorado club with Global Membership.” Their bi-monthly magazine *The Low Down* is worth the subscription cost, and in fact you will often see it quoted in 73.

If you are a reader, you will find QRP columns in the major magazines, and a number of books are available from the usual sources.

Did I say we are a weird bunch? If I did, I meant inventive and playful. A few years ago a well-known QRP'er, Chuck Adams K7QO (then K5FO,) decided that QRP-L members should get away from their computers and onto 40M once in awhile, so he invented the “QRP-L Fox Hunt.” A single station is “the Fox” for two hours, and everybody else tries to work him, or “bag a fox pelt.” The Fox Hunt has become an annual event, with Fox operations twice a week through the winter. I had the honor to be a Fox a few weeks ago, and believe me, you haven't worked a pileup until you have had 150 or more stations calling you within the space of two or three kHz. They are all QRP, but many of them have signals of S-9 or better, and the “baying of the hounds” is

just amazing. Sustained CW QSO rates of better than one per minute are quite common, and in my two hour stint I worked stations in 42 states.

A few weeks ago someone on QRP-L commented on the “elitism” of the First Class Operators Club, and the immediate result was the formation of the Second Class Operators Club, complete with motto “AGN?,” member numbers, and a contest last weekend.

My point is that QRP'ers, while very skilled, dedicated, and inventive, are always mindful that the hobby should be fun. They do a darn good job of keeping it that way.

It's difficult to do a general article on QRP because the topic is so broad. In “traditional” ham radio we have special interest categories for antennas, construction, design, contesting, DX, awards, emergency communications, and so on. You can put QRP in front of every one of those topics, and it's only a slight reduction in scope, if any. I've written nearly as much as a Wayne Green editorial here, and kept pretty much on the single track of “QRP,” yet I've barely scratched the surface. And at the best of times words can only convey so much, so why don't you try turning down the wick and seeing what you can do with QRP ... and what QRP can do for you. It will be like discovering amateur radio all over again. 73

Exploring the Kenwood TM-D700A

continued from page 16

display, and their function is labeled on the screen. Want to check the input frequency of the station you are working — again the push of a single button. Power can be adjusted from a low level (5 watts) to a medium level (10 watts) to the full power of 50 watts on VHF or 35 watts for UHF.

Tone can be easily switched off, or by pressing the same button you can activate the tone to access your favorite repeater. Pressing that button again activates Continuous Tone Coded Squelch System (CTCSS) so that your receiver will only respond to signals that are transmitting the correct tone. A third time activates Digital Code

Squelch (DCS), which also allows you to ignore unwanted signals. The 1750 Hz tone used for European repeaters is also included. If you can receive a station but do not know what the tone requirement is for that station to accept your signal, this radio can even scan for the required tone. Any tone you can transmit can be detected by scanning, including CTCSS or DCS codes, which is a tremendous benefit while traveling. I like to have repeaters identified along my planned route, and if a tone has been added or changed since the last repeater directory entry, this feature is essential to accessing the repeater.

Speaking of repeaters, this unit can even be set to automatic simplex checker so that it periodically checks the repeater input frequency on its own and gives you a visual indication if you are within range to work the other station simplex. If you are traveling in an unfamiliar territory, it's sometimes difficult to determine which repeaters listed in the directory are actually available and in use. The TM-D700A has a visual scan function that gives a graphic representation of the active frequencies in the area and their relative signal strength. By sliding a cursor to an indicated signal, you can monitor that frequency. No more random scanning in order to find which of the 27 repeaters in town are the popular ones.

Another very convenient feature of this radio is its programmable memory (PM) function. This permits you to save up to 5 configurations that maintain key information about your preferred settings. This could prove very useful if multiple people use the same radio so that each could have their own preferences automatically come into play with the push of a button. Likewise, you could have one PM setting for everyday use; a second for severe weather; a third for emergency or disaster services; a fourth for traveling; and still have one left over for your spouse.

I told you that it would take two issues to tell you about this radio. This month we scratched the surface of what Kenwood's latest offering can do. Next time, we'll look at all the special functions it can perform. In the meantime, if you get a chance to play with a TM-D700A, take advantage of it! 73

HOMING IN

continued from page 55

objective was to get as many of the searchers to the simulated crash site as soon as possible. This meant that cooperation among RDFers would be important, in distinct contrast to most competitive foxhunts.

"Sixteen South Shore foxhunters participated in this drill," wrote organizer Gil Follett WA1GDJ of Abington MA. "Brad Anselmo N1VUF gave pointers regarding what to do in an actual search and rescue, including how to handle an injured victim. Brad designated a special call-in frequency for when the victim was found, so that in a real situation there would be less chance of having that information broadcast prematurely by the media. He also cautioned that the victim's name should not be stated over the radio and that only pertinent general information (such as gender, age, and nature of injury) should be transmitted."

WA1GDJ had sectioned off the map into various quadrants so that searchers could proceed in an organized manner and attempt to triangulate on the signal from the foxbox/ELT. Carl Aveni N1FYZ was net control for the drill operations, using a base station on battery power running in the parking lot.

Within two and a half hours, all teams had found the foxbox and had practiced relaying information regarding injuries of the volunteer "victims," one of whom turned out to be Ritchy Guild KB1EAJ. Does this give you some ideas?

Pre-Y2K E-mail bugs

I enjoy getting your transmitter hunt reports and RDF stories, most of which now come via E-mail. I read every one and try to reply in a timely manner. Unfortunately, an E-mail problem arose in early November and took almost two months to overcome. It affects customers using one particular version of America Online software for Macintosh computers.

At first, AOL Tech Support claimed that the problem was entirely on users' computers, and insisted that I reload my software. After that didn't work, they agreed that it was a systemwide server problem and gave assurance that it would be fixed soon. A month and several phone calls later, the company admitted that there was no certainty that a timely fix was forthcoming. So I ended up having to change my software to another version, which necessitated hardware changes on one of my computers.

By that time, it was apparent that some incoming E-mail and files had been irretrievably lost. So if you sent E-mail to me

in the last two months of 1999, expected an answer and didn't get one, please try again now. And if you're not on E-mail, or have some great snapshots to contribute, then use my Post Office box, which has suffered from neglect since E-mail gained popularity. 75

QRP

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me, there's nothing wrong with the Jersey Fireball 40. It's trying to contact someone with 40 mW — that's the kicker. To complicate matters, you're rockbound, or should I say, "can bound." Finding someone calling CQ on 7.080 is asking for a lot! So, I did what Randy KD8JN does. I built the amplifier! But I only used it when I needed to!

The thinking went like this. I would make a contact with the one-watt amp in line. Then drop it out of line. In almost all cases, I was still S3 copy by the other station. Will I be able to work 5A1A? Nope! But even with Randy's SB-220 cooking, he was not heard by 5A1A either. So, it's not that much of a heartbreaker. I think Randy ended up using MCI to make a QSO with 5A1A! So it goes ... and that's another story, too.

Personally, with the Sun spotting up like a teenager's face on prom night, I would stick to either 10 or 20 meters. That's going to be your best bet for making QSOs. Remember that you'll have to supply your own parts for the output filter. Don't worry, the values are listed in the instructions.

Speaking of which, the instructions for the Jersey Fireball 40 are first-class. Not a Heathkit by any means, but clear and precise. You should not have any trouble assembling or troubleshooting your Jersey Fireball 40.

Where do I get my Jersey Fireball 40?

Glad you asked. The Jersey Fireball 40 is the product of the NJ-QRP club. The club is selling the basic 40-meter kit, including the PC board, for \$10. Write to NJ-QRP club, George Hern N2APB, 45 Fieldstone Trail, Sparta NJ 07871. Or visit their Web site at [www.njqrp.org]. E-mail: [n2apb@amsat.org].

Other goodies

If you plan on stuffing the PC board with the parts to use the amplifier, be sure you use a metal-case 2N2222. They seem to work better at RF than the plastic-case joddies.

Don't have TiCK keyer? Get yours from: Embedded Research, P. O. Box 92492, Rochester NY 14692. Web: [www.frontiernet.net/~embres/].

You might find this helpful, too: Extra Strength Tylenol, McNeil PPC Inc., Fort Washington PA. Or check your local Walgreen's or CVS. Running milliwatts is a challenge, but it can also produce headaches! 75

ON THE GO

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invaluable in a disaster support operation under these circumstances.

Now I have a selection of headsets, earphones, earplugs, etc., and there are advantages or disadvantages to each. I decided that the ideal system would be lightweight, comfortable, and provide good audio in both directions. For situations like this, it would be nice if it had some degree of noise cancellation. I remembered using a headset that met these characteristics as a pilot, and wondered if a similar unit was available which would work with my amateur radio gear. After all, there are few places noisier than the cockpit of a small piston-driven aircraft, and pilots depend upon their communication gear for more than just casual conversation.

The TR-2000 headset from Warren Gregoire Associates is just what the doctor ordered for this application. It was Warren's headset that I had relied on in the cockpit and, as it turns out, Warren is K6QX. I checked and found that Warren had a headset with a boom microphone specifically designed for amateur radio use. This headset weighs in at only 12 ounces so that it can be worn comfortably for long periods. The earpieces have padded earmuffs that significantly minimize background noise, and the padding on the earpieces and on the headband ensure a comfortable and secure fit. Since pilots tend to wear their headsets for long periods of time, their experience with aircraft gear has helped them to design a very practical and comfortable set. The boom microphone is spring-loaded and, once positioned, tends to stay where you want it. The electret element in the microphone draws its power from the microphone jack on most modern radios, or a battery if used with a vintage radio. The acoustic noise canceling design was developed for use in the aircraft cockpit and works well in other noisy environments. In other words, it's

Continued on page 64

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Bioelectrifier Handbook: This explains how to build or buy (\$155) a little electrical gadget that can help clean the blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

The Secret Guide to Wisdom: This is a review of around a hundred books that will help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait! You see some of the gems you've missed reading. \$5 (#02)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some difficult lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products. \$5 (#04)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. \$5 (#10)

Wayne's Caribbean Adventures: My super budget travel stories - where I

visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

Julian Schwinger: A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy any taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

Moondoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the videos, looked carefully at the photos, read the astronaut's biographies, and talked with some of my readers who worked for NASA. This book cites 25 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is

what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait! You'll hear some of Gotschalk's fabulous music! \$5 (#33)

The Radar Coverup: Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields. \$3 (#34)

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system—the least effective and most expensive in the world. \$5 (#35)

Aspartame: a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

One Hour CW: Using this sneaky booklet even you can learn the Morse Code in one hour and pass that dumb 5wpm HF entry test. \$5 (#40)

Code Tape (T5): This tape will teach you the letters, numbers and punctuation you need to know if you are going on to learn the code at 13 or 20 wpm. \$5 (#41)

Code Tape (T13): Once you know the code for the letters (#41) you can go immediately to copying 13 wpm (using my system). This should only take a couple of days. \$5 (#42)

Code Tape (T20): Or, you can start right out at 20 wpm and master it in a weekend. \$5 (#43)

Wayne Un-Dayton Talk: This is a 90-minute tape of the talk I'd have given at the Dayton, if invited. \$5 (#50)

Wayne Tampa Talk: This is the talk I gave at the Tampa Global Sciences conference—where I cover amateur radio, cold fusion, health, books you should read, and so on. \$5 (#51)

\$1 Million Sales Video: The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

Reprints of My Editorials from 73. Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

1996 Editorials: 120 pages, 100 choice editorials. \$10 (#72)

1997 Editorials: 148 fun-packed pages. 216 editorials. \$10 (#74)

1998 Editorials: 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

1999 Editorials: 132 pages of ideas, book reviews, health, education, and anything else I think you ought to know about. \$10 (#76)

2000 Editorials: In the works.

Silver Wire: With two 3" pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

Wayne's Bell Saver Kit. The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

NH Reform Party Keynote Speech. It wov'd 'em when I laid out plans for NH in 2020, with much better, yet lower cost schools, zero state taxes, far better health care, a more responsive state government, etc. \$1 (#85)

Stuff I didn't write, but you need: **NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$25 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs—such as the ice ages, the Earth being a magnet, the Moon causing the tides, and etc. \$25 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

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Use the numbers in the brackets or copy page and mark the books you want. Add \$3 s/h per total order in US (\$5 priority mail), \$6Can. \$10 foreign.

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Barter 'n' Buy

Number 64 on your Feedback card

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost)—comes to 35 cents a word for individual (noncommercial) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the August 2000 classified ad section is June 10, 2000.

President Clinton probably doesn't have a copy of *Tormet's Electronics Bench Reference* but you should. Check it out at [www.ohio.net/~rtormet/index.htm]—over 100 pages of circuits, tables, RF design information, sources, etc. BNB530

TELEGRAPH COLLECTOR'S PRICE GUIDE: 250 pictures/prices. \$12 postpaid. **ARTIFAX BOOKS**, Box 88, Maynard MA 01754. Telegraph Museum: [http://wltip.com]. BNB113

Great New Reference Manual with over 100 pgs of P/S, transistor, radio, op-amp, antenna designs, coil winding tables, etc. See details at [www.ohio.net/~rtormet/index.htm] or send check or M.O. for \$19.95 + \$2.00 P&H to RMT Engineering, 6863 Buffham Rd., Seville OH 44273. BNB202

RF TRANSISTORS TUBES 2SC2879, 2SC1971, 2SC1972, MRF247, MRF455, MB8719, 2SC1307, 2SC2029, MRF454, 2SC3133, 4CX250B, 12DQ6, 6KG6A, etc. **WESTGATE**, 1-800- 213-4563. BNB6000

QSL CARDS. Basic Styles; Black and White and Color Picture Cards; Custom Printed. Send 2 stamps for samples and literature. **RAUM'S**, 8617 Orchard Rd., Coopersburg PA 18036. Phone or FAX (215) 679-7238. BNB519

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Browse our web site and check out the "Monthly Special." TDL Technology, Inc. **www.zianet.com/tldl**. BNB500

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ROHN TOWERS HUGE DISCOUNTS CHECK PRICES AT HILLRADIO.NET BNB600

Wanted COLLINS S-LINE Pristine (RE) 32S3-A, 75S3-C, 516F2, 312B4, 30L1, or 30S1 and SM-3. Willing to pay top dollar for the station I have wanted since age 13. 1-512-925-3907 (cell), 1-888-917-9077(home), toll free residential, willbryant@aol.com WA5JUL Bill Bryant. **THIS STATION IS FOR PERSONAL USE, NOT FOR RESALE!** BNB700

ON THE GO

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comfortable, works well in a real-world environment, and provides good audio.

The interesting thing about this headset is that it is available for a very reasonable price. It costs only \$44.95 assembled, or \$29.95 in a kit. A connector kit is available for about ten dollars, depending upon the radio to which it will be connected. The directions for the kit are easy to read and follow, and make for one of those quick and easy projects that is just plain satisfying.

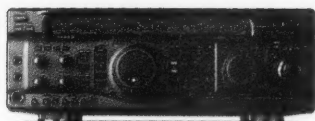
There are a couple of accessories that may make your operating more pleasant. There are two types of push-to-talk switches. A hand-held push-button located in a tubular case fits comfortably in the hand. During listening periods it can be draped over the shoulder, or tucked through a belt loop to keep it handy. There is also a foot switch that I find very handy, since I often need to take copious notes during disaster support or other nets. This keeps my hands and desk-top free for paper and pencil work.

I like this headset and believe it represents a lot of value for a very small price. Check out their Web site at [www.warengregoire.com], or you can use their toll free number, 1 (800) 634-0094. **73**



FT-1000MP

The radio of choice for world-class contest operators, the FT-1000MP provides 100 Watts of power, Enhanced DSP™ Dual In-band Receive, Cascaded IF filters, General Coverage RX, and 160-10 M TX. (DC-only version also available.)



FT-920

The FT-920 HF/6M Transceiver is designed for today's active Ham. It features high-speed DSP in all modes, 127 memory channels, AFSK or FSK Digital operation, new-technology MOSFET PA finals, high-speed Automatic Antenna Tuner, and high-resolution LCD display.



FT-1000D

Truly an elite-class HF masterpiece, the 200 Watt FT-1000D provides Dual Receive (in-band or cross-band), Cascaded IF Filters, extraordinary Dynamic Range, DDS, high-speed Automatic Antenna Tuner, and 100 memory channels.



FT-100

This ultra-compact HF/VHF/UHF 100 Watt Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.



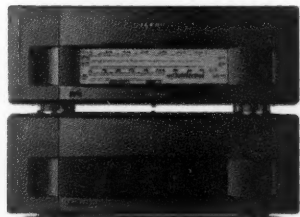
FT-840

Affordable yet feature filled, the FT-840 is an ideal traveling companion. It offers 160-10M TX with general coverage RX, 100 memory channels, DDS, CTCSS, Twin Band Stacking VFOs, and excellent receiver dynamic range.



FT-600

This compact 100 Watt HF Transceiver offers the utmost in operating simplicity. The MIL-STD rated FT-600 covers the 160-10M Amateur bands with General Coverage Receive, 100 memory channels, Direct Keypad Frequency Entry, and a front-mounted speaker.



VL-1000/VP-1000

The VL-1000 Quadra System is a Solid-State Linear Amplifier featuring four twin-MOSFET PA modules to produce 1000 Watts of clean power output on 160-15 Meters (500 Watts on 6M, modifiable for 12/10 meters). Included are an Automatic Antenna tuner, 2 Input and 4 Output Antenna Jacks, and extensive status displays on the multi-function LCD.

FT-847

The introduction of the FT-847 completely redefines base station operation by offering three radios in one—HF, VHF/UHF and Satellite. A full power multi-mode transceiver, the appropriately named Earth Station covers the HF, 50 MHz, 144 MHz and 430 MHz bands, and it includes crossband Full Duplex operating capability for satellite work. Its exceptional receiver performance is ready for all aspects of DX work thanks to the DSP filtering. And for local FM work both CTCSS and DCS encode/decode are built in. The FT-847 is an engineering breakthrough offering you the earth, the sky, and the moon in one compact package.



THE TASK MASTERS.

They're out there. Those elusive DX signals that can't poke through the QRM regardless of the late-night hours you put in trying to find them. But when a Yaesu HF enters the picture, weak signals suddenly jump into your headphones. Yaesu's High Frequency transceiver technology uniquely combines years of RF and AF design know-how with cutting edge advancements in IF filtering, noise reduction, and dynamic range. Whether you're on high bands or low, at home or away, the high frequency technology of Yaesu's task masters quickly fills up your log with contacts. Learn more about Yaesu products on the web at www.yaesu.com

YAESU

Choice of the world's top DX'ers.

©1999 Yaesu USA, 17210 Edwards Road, Cerritos, CA 90703, (562) 404-2700. Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

An APRS® transceiver built for tomorrow's communication needs with advanced features available today

NEW!



TM-D700A DATA COMMUNICATOR 144/440MHz FM Dual Bander

Conspicuous with its extra-large amber & black display, Kenwood's new TM-D700A is fully equipped to make the most of the exciting opportunities offered by the Kenwood Skycommand System, SSTV, GPS and APRS®—the Automatic Packet/Position Reporting System that is rapidly gaining popularity worldwide. This mobile transceiver with built-in TNC offers a wide range of data communications options, including simple packet operation using the AX.25 protocol. You can also send and receive SSTV images using Kenwood's VC-H1. Ham radio is truly entering a new era.

APRS® (Automatic Packet/Position Reporting System)

- **Position/directional data**
With an NMEA-0183 compatible GPS receiver you can transmit position data for automatic calculation of distance, current speed and heading. Last 4 digits can be masked for position ambiguity. Manual input of latitude/longitude is also possible.

- **Versatile messaging**
Transmission of position data can be accompanied by a choice of programmable status text (up to 28 characters), position comments (15 settings), icons and bulletins. For added messaging flexibility, individual alpha messages (up to 64 characters) can also be sent.

- **Station list**
Store received APRS® data in up to 40 station reports.

- **Grid square locator**
Position data is displayed on the grid square locator for visible reference.

- **BCON TX interval**
(0.2/0.5/1/2/3/5/10/20/30 min.)
- **Packet path selection for Digipeat**
- **Weather station & PHG data reception**
- **Digipeat station and DigI function capability**
- **Auto Message Reply**
- **Audible APRS® message receive**
(call sign) notification (requires VS-3)
- **Waypoint position data output**



FEATURES

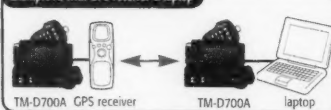
- Full Dual-band operation: VHF x VHF/VHF x UHF/UHF x UHF
- Wide-band receive: 118-524, 800-1300 MHz (excluding cellular blocked + frequencies)
- Detached panel (extension cable and panel holder supplied) with extra-large (188 x 54 dots) backlit LCD and multifunction key display (reversible)
- Improved key operation announcement with optional VS-3 voice synthesizer
- Built-in 1200/9600bps TNC compliant with AX.25 protocol and KISS mode
- Simplified packet monitoring
- SSTV functions with Fast FM for transmission of images in just 14 secs (approx.) and dual receive for voice and image transmissions (two frequencies simultaneously)
- 200 memory channels with 8-character memory name input
- Up to 10 programmable memory scan banks
- Easy-to-use menu system similar to the TH-D7A
- Built-in DCS (Digital Code Squelch) and CTCSS encode and decode
- CTCSS tone frequency scan
- DCS code scan
- 9600bps PC-based packet communications for chat, BBS

- Kenwood Skycommand System (KSS) II for remote control of fixed HF transceiver (TS-570S/D(G) or TS-870S)
- DX packet cluster monitoring
- Cross-band repeater
- Wireless remote controller
- 1750Hz tone burst
- D-sub 9 pin terminal (for PCs)
- GPS input terminal (NMEA-0183)
- Visual band scope
- Mute function
- Memory control program available via Internet access
- New backlit microphone with alphanumeric message input.

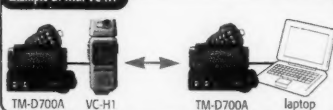


D-sub 9-pin terminal
GPS input
Data Terminal
Panel Display
Mic

Example A: with GPS receiver & laptop



Example B: with VC-H1



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Amateur Radio Products Group

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